ME-1205

LOGITEK, INC.

electronic timing devices and systems

INSTRUCTION MANUAL

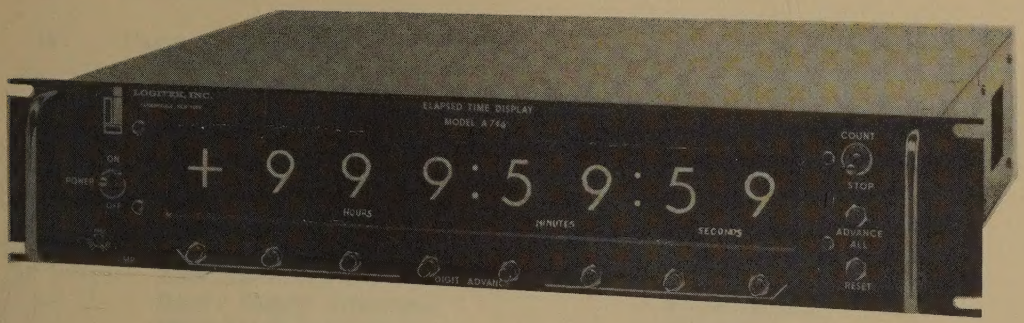
MODELS A-746-0 & A-746-1

ELAPSED TIME DISPLAY

INSTRUCTION MANUAL

MODELS A-746-0 & A-746-1

ELAPSED TIME DISPLAY



LOGITEK INC.

CONTENTS

I Specifications

- Operating
- Physical
- Environmental

Functions of Controls
Table I

II Operating Instructions

- Remote Operations
- Internal Operations
- Hold Mode Operation
- Sign Logic
- Decades & Count of Six Units
- Input Logic
- Logic

III Maintenance

IV Parts Listing

- Replacement Ordering Information
- Spare Parts

V Manufacturing Drawings

Block Diagram	A-746-0-1002
Count of Six Diagram	A-746-0-1003
Forward-Backward Decade	A-746-0-1004
Power Supply Schematic	A-746-0-1005
Mechanical Assembly	ME-610 1 of 2
Rear View	ME-610 2 of 2
Power Supply Sub-Assembly	AS-701
Power Supply Assembly	AS-702
Ass'y-Detail Terminal Board 5	AS-703
Wiring Diagram - Card Connectors	AS-704
Wiring Diagram - Readout	AS-705
Chassis Layout & Wiring	AS-707
External Wiring	AS-708
Surface Wiring - Sect. 3	AS-709
Surface Wiring - Sect. 4	AS-711
Card Assembly-Cards 2, 4, 6, 7, 8.	AS-723
Card Assembly-Cards 3 & 5	AS-724
Card Assembly-Card No. 1	AS-726
Module Specifications	AS-737
Manual Changes	

SECTION 1

SPECIFICATIONS

INTRODUCTION

This manual is designed to familiarize competent technical personnel with the operation and maintenance of Logitek, Inc. Model A746, Elapsed Time Display. Contained herein, are discussions of specifications; operations; including design; maintenance and trouble shooting; parts list and complete manufacturing drawings.

SPECIFICATIONS

Operating:

A. Input Voltage - 105-125 VRMS @ 60 CPS.

B. Input current - 200 MA RMS MAX.

C. Timing Input - Pulses spaced at 1 sec. intervals.
Model A746 - One level - ±18 + 2 VDC @ 20 ua MIN.
Zero level - -8 +2 VDC @ 2ma MIN.
Rise time (zero to one) 10 u sec. MAX.

Model A746-1 - One level - 0 +0.5 VDC @ 1 ma MIN.
Zero level - -6 ± 1 VDC @ 2 ma MIN.
Rise time (zero to one) 10 u sec. MAX.

D. External Gate Input - Stop - 0±0.5 VDC @ 0.5 ma MIN.
Count - more than ±9 VDC @ 50 ua MIN.

E. Time Zero Output - Time zero - 0±0.5 VDC @ 3 ma MAX.
Not time zero - ±15 ±2 VDC @ 100 ua MAX.

F. Remote set & reset inputs - Switch closure to ground to set or reset externally or set 0 ± 0.5 VDC @ 4 ma MIN.
Normal more than ±17 VDC @ 50 ua MIN.
Reset - 0±0.5 VDC @ 150 ma MIN.
Normal - more than 15 VDC @ 50 ua MIN.

Physical:

A. Weight - 15 lbs. MAX.

B. Size - 19" relay rack mount 3 1/2" high 12 " deep.

C. Finish - Front panel FED. STD. 595-25109sem-i-gloss blue enamel.

Fabricated sheet metal-alodine per Mil-C-5541.

Environmental:

A. Temperature - +32°F to +125°F. (operating)

B. Temperature - -40°F to +85°F. (storage)

C. Altitude - 10,000 Ft. MAX.

D. Humidity - 95% R.H.

Functions of Controls

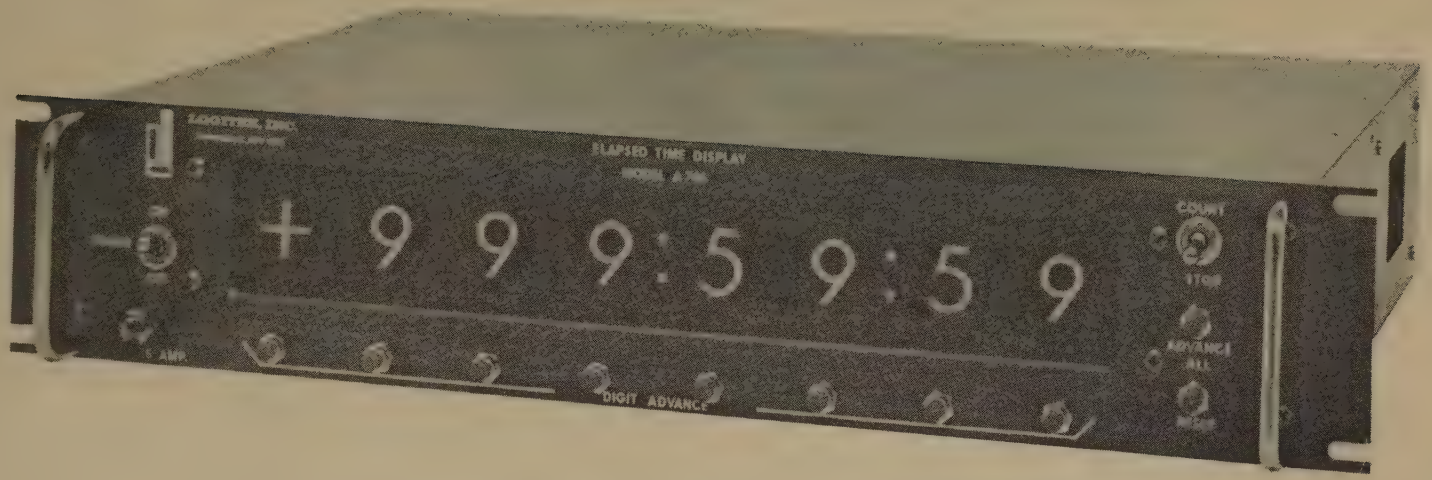
(See Drawing Number ME610)

Nomenclature	Ref. Des.	Location	Function
Off-On switch	S1	Left side of front panel	Controls unit power
Fuse (1/2 A)	F1	Left side of Front panel.	Line Fuse
Count-stop switch	S2	Right side of front panel.	Count unit advances once for each input pulse. Stop-counting is disabled.
Set-sign-digit Advance	S3	Beneath display of sign.	Each activation changes the sign of the display, and the direction of counting.
Reset	S4	Right side of front panel.	Sets display to 000:00:00
Advance All	S5	Right side of front panel.	Steps all digits except sign, one count for each activation (See Table I).
Set seconds-Digit advance	S6	Beneath display of second digit.	Advances seconds digit one count for each activation.
Set 10 seconds-digit advance	S7	Beneath display of 10 seconds.	Advances 10 seconds digit one count for each activation.
Set minutes-digit advance	S8	Beneath display of minutes digit.	Advances minutes digit one count for each activation.
Set 10 minutes digit advance	S9	Beneath display of 10 minutes digit.	Advances 10 minutes digit one count for each activation.
Set hours-	S10	Beneath display of hours digit.	Advances hours digit one count for each activation.
Set 10 hours digit advance	S11	Beneath display of 10 hours digit.	Advances 10 hours digit one count for each activation.
Set 100 hours-digit advance	S12	Beneath display of 100 hours digit.	Advances 100 hours digit one count for each activation.
Inputs & Outputs	--	Barrier strip on rear dust cover.	Enables connection to all outputs & inputs (employ #5 solder lugs).

Table I

Hours	Minutes	Seconds
000	00	00
1 11	1 1	1 1
222	22	22
333	33	33
555	55	55
666	06	06
777	1 7	17
888	28	28
999	39	39
000	40	40
1 11	51	51
222	02	02
333	13	13
444	24	24
555	35	35
666	46	46
777	57	57
888	08	08
999	19	19
000	20	20
1 11	31	31
222	42	42
333	53	53
444	04	04
555	15	15
666	26	26
777	37	37
888	48	48
999	59	59
000	00	00

Readouts achieved by activating the "Advance all" switch.


ELAPSED TIME DISPLAY
+ 9 9 9 : 5 9 : 5 9
COUNT
STOP
ADVANCE ALL
RESET
AMP
DIGIT ADVANCE

SECTION 2

OPERATING INSTRUCTIONS

OPERATING INSTRUCTIONS

The Elapsed Time Display unit operates as depicted in the system block diagram - drawing no. A746-0-1002. The unit accepts pulses at a one second repetition rate, and displays the sum algebraically, of the time elapsed from a time reference, T, and the reference time, T_O, in hours, minutes and seconds. The time reference may be set to any number from minus 999;59;59 to plus 999;59;59 by activating push button switches S3 through S12. Each digit switch advances the count of the particular counting unit which it is associated with by one count for each activation. The sign switch S3, changes the plus or minus sign displayed each time it is activated. The reset switch, S4, sets all digits to zero. The advance all switch, S5, advances the count of all digits by one count each time it is activated.

In order to set a particular reference time, the unit may be reset, then all digits advanced to a time position less than desired (Table 1 illustrates thirty readout which may be attained) and each digit subsequently adjusted to its final position. An alternate method is to preset each digit at a small number which would, after activating the advance all switch the appropriate number of times, yield the desired referenced time (in this manner, any readout may be attained within ten closures of the advance all switch).

Remote Operations

Provisions for remotely simulating any or all of the operations required to set reference time is provided at the barrier stop located on the rear dust cover. Remote closures may be utilized to provide multiple operation of Elapsed Time Display units, all providing the same readout. A common control station or many such stations, consisting of a bank of ten switches may be used to control the time reference setting of up to one hundred display units if desired.

Internal Operation

If the count is to be internally controlled, the count begins when S2 is placed in the "COUNT" position. If control from an external switch or gate is desired, S2 must be placed in the count position and the external gate signal must be brought from 0.0 ± 0.5 volts to greater than 9 volts to enable gate M2 to begin the count. If the reference time was negative, the display unit counts down until it reaches the 000:00:00 position at which time the zero output goes from +15 ±2 volts to 0.0 ± 0.5 volts, the sign of the readout changes automatically and the unit begins to count up. (Note at time zero, no sign is displayed).

Hold Mode Operation

The count may be discontinued at any time and the readout held in its last position by any of three methods: The one second pulse may be discontinued; the external gate input may be brought to 0 plus or minus 0.5 volts; or the count switch S2 may be placed in the stop position. If an external connection from the time zero output to the external gate is made, the unit will count down to 000:00:00 and stop.

Sign Logic

The sign of the readout is controlled by Flip-Flop M3, through Nand gates M5-1 and M5-2 (Dwg number A746-0-1002). If Flip-Flop M3 is set to the "one" state by the set sign switch, S3, the count up line is energized, the display indicates positive (+) sign, and the counting units, cards 2-8, increase one number for each one sec. pulse received. Counting continues until a readout of 999:59:59 is reached at which time the counter is reset. If Flip-Flop M3 is set to its "zero" state by S3, the display indicates negative (-) sign, the count down line is energized and the counting units decrease one number for each one sec. pulse received. Counting progresses until at the time zero condition, Nand gate M4-2, and so setting Flip-Flop M3 in the "one" state above. At time zero, Nand M6 also de-energizes Nands M5-1 and M5-2 causing no sign to be displayed.

Decades and Count of Six Units

The configuration for forward - backward counting decades cards #2, 4, 6, 7, and 8 (Dwg. #A746-0-1002) is depicted in Dwg. # A746-0-1004. Pulses applied to the input terminal, trigger module M8 which is an "External Set Isolator", and is necessary to allow Flip - Flop M10 to be triggered externally. (Direct inputs from previous counting units do not necessarily allow a change in level to occur when grounded by a set switch input. This level change is needed to trigger Flip-Flop M10). Pulses out of M8 are applied to the input of Flip-Flop M10 which represents the least significant bit of binary feedback counter comprised of Flip - Flops M10, M13, M15, and M19. The logic between Flip-Flops, (Nands M11, M14, and M16, and "Ands" M12, M17, and M18), performs the steering necessary for forward-backward count-

ing. The input to M13 with "And" M12 enabled, is described by the Boolean Equation:

$$Bc = (A \cdot \overline{U}) \cdot (\overline{A} \cdot U)$$

Which reduces to:

$$(Bc = A \cdot U + \overline{A} \cdot \overline{U})$$

Where:

Bc = Count command for Flip-Flop B (M13)
A = "One" output of Flip-Flop A (M10)
U = Count up line
$\overline{A}$ & $\overline{U}$ = The compliments of A & U respectively.

The above says simply that in order to count up (Forward) the "One" output of M10 is used to trigger M13, while in order to count down (Backward) the "zero" output of M10 is used. Identical logic is used between Flip-Flops M13, M15, M19, and the output to the next counting unit. Since the normal scale of a four bit binary counter is 16, feedback is used to convert to a scale of 10. The feedback required while counting up, however, is different from that required to count down if the same decoding matrix (M21) is to be used. This gated feedback is performed in "Ands" M12, M17, M18. The B-D converter, M21, decodes the output of Flip-Flops M10, M13, M15, and M19 to one line in ten selection which is inverted in dual inverters M22-M26 providing the drive necessary to light the readout display units.

The scale of six counter has similar up-down logic to the scale of ten (See Dwg. # A746-0-1003) but three Flip-Flops are utilized instead of four, the feedback is different but similar in theory and only six lines are required from the decoding matrix instead of ten.
See section IV of this manual for normal waveforms.

Input Logic

The input logic is composed of M1 & M2 (See Figure 1). M1 is a buffer to match the input on second pulse signal of -8±2 volts to +8±2 volts, in the case of Model A746, or -6±1 volt to 0±0.5 volts for model A746-1 to the 0 plus 0.5 minus 0 volts and 10 ± 2 volts required by the internal logic. M2 performs an "And" function gating the buffered one second pulses with the count switch S2 or the external gate, disabling the count if the count switch is in the stop position, or if the external gate is 0 plus 0.5 minus 0 volts.

Logic

All logic and gating modules used in the construction of the Elapsed Time unit are standard products of Logitek, Inc. (See parts list section V for individual modules) Use only silicon solid state circuitry and operate over the temperature range of $-55^{\circ}C$ to $+71^{\circ}C$. Modules are of cordwood type construction and are encapsulated in epoxy cases. Replacement modules are available as off-the-shelf products of Logitek, Inc. Logic levels utilized in the standard Logitek, Inc. logic are defined as follows: a binary "zero" is 0 volts plus 0.5 volts minus 0 volts from a 100 ohm maximum source impedance, a binary "one" is 14±2 volts. In order to drive inputs such as the external gate (Figure 1) or the remote switch inputs the above levels should be adhered to. An open circuit may be substituted, however, for the binary "one" condition.

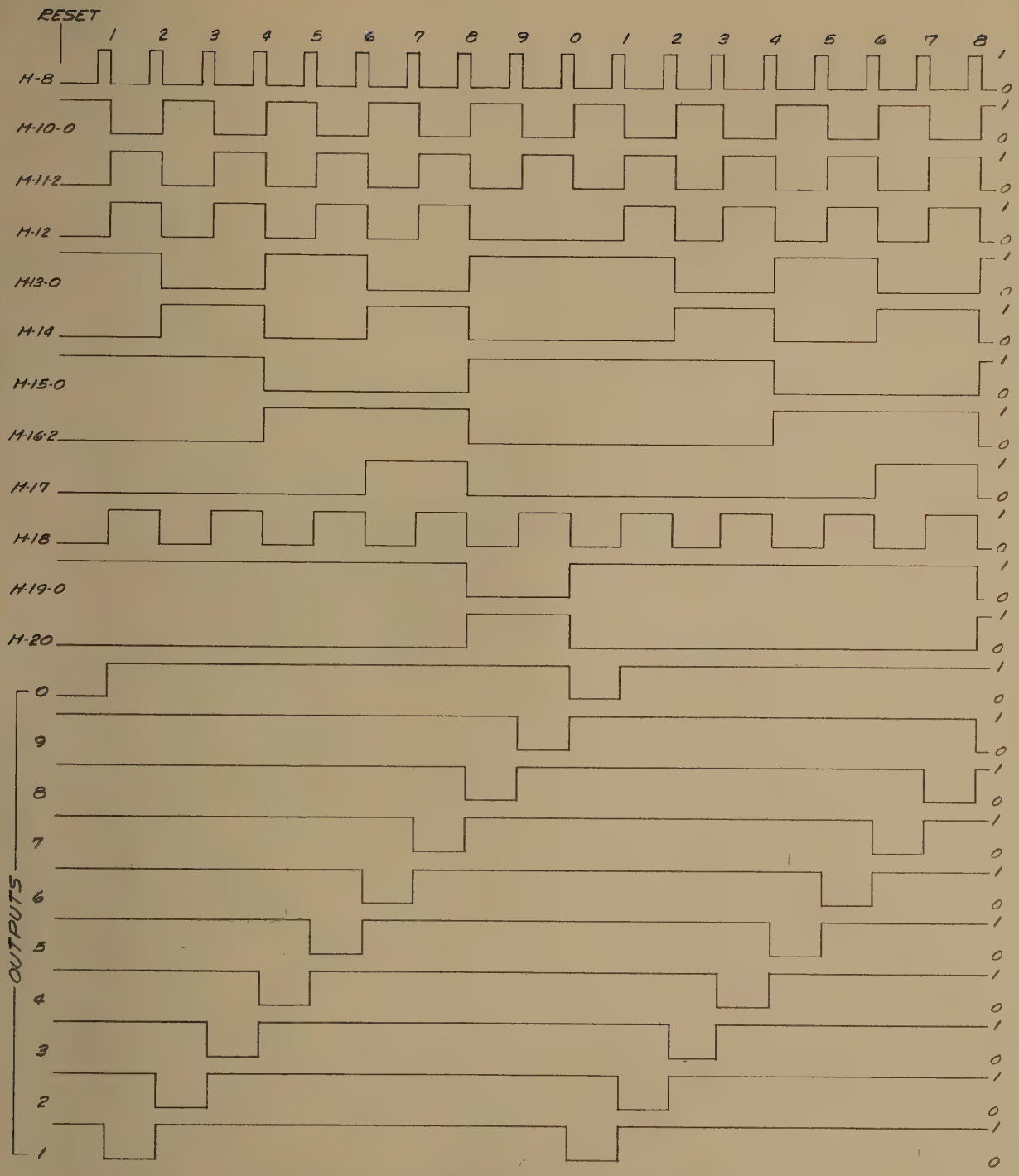


FIGURE 1

WAVE FORMS - DECADE - COUNT INCREASING

REFERENCE: DRAWING A-746-0-1004

OUTPUT OF H-9 = ONE

BEM-8-13-69

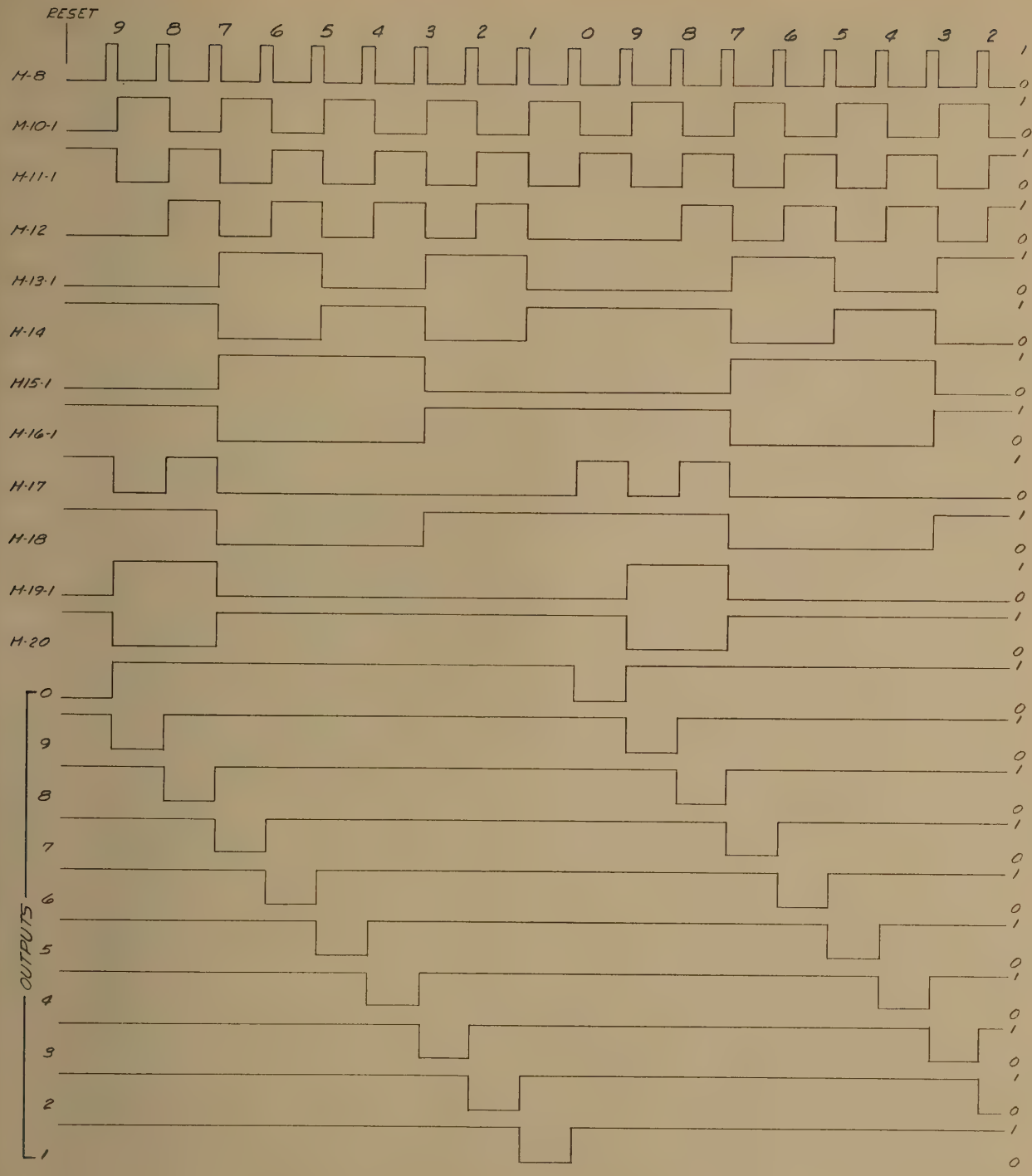


FIGURE 2

WAVE FORMS - DECADE - COUNT DECREASING

REFERENCE: DRAWING A-746-0-1004

OUTPUT H-7 = ONE

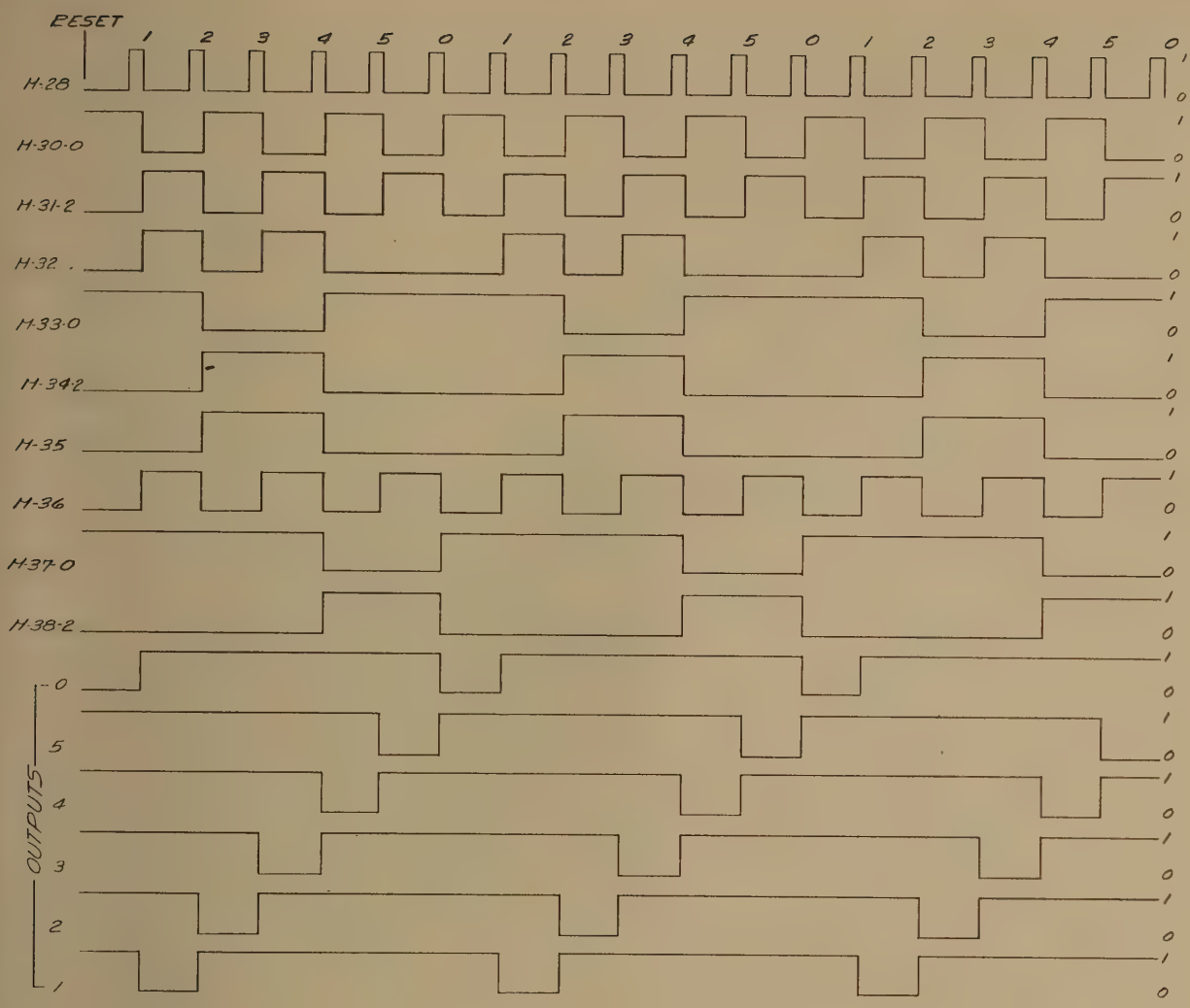


FIGURE 3

WAVE FORMS - COUNT OF SIX - COUNT INCREASING

REFERENCE: DRAWING A-746-0-1003

OUTPUT OF H-29 = ONE

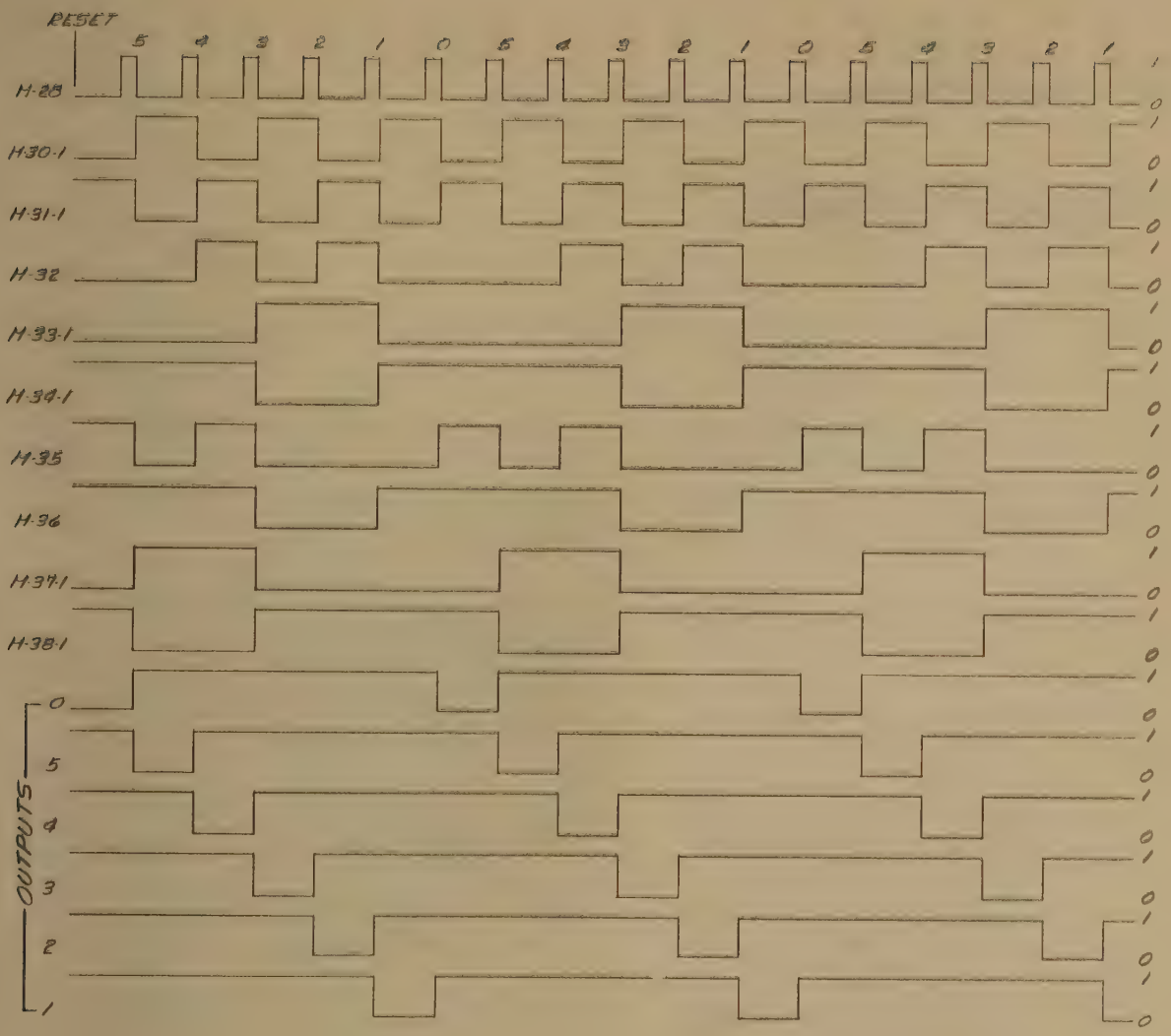


FIGURE 4

WAVE FORMS - COUNT OF SIX - COUNT DECREASING

REFERENCE: DRAWING A-746-0-1003

OUTPUT OF H-27 = ONE

SECTION 3

MAINTENANCE

Components and connector location -- Ref. Drawings A746-0-1002 and ME- 610. (Sheets 1 & 2)

Component	Function	Location
Card No. 1	Contains input and sign logic.	Card rack-mates with connector J1-Ref. Drawing AS-726.
Card No. 2	Contains decade counting and decoding for seconds digit.	Card rack-mates with connector J2-Ref. Drawing A746-0-1004.
Card No. 3	Contains scale of 6 counting and decoding for tens of seconds digit.	Card rack-mates with connector J3-Ref. Drawing A746-0-1003.
Card No. 4	Contains decade counting and decoding for minutes digit.	Card rack-mates with connector J4-Ref. Drawing A746-0-1004.
Card No. 5	Contains scale of 6 counting and decoding for tens of minutes digit.	Card rack-mates with connector J5-Ref. Drawing A746-0-1004.
Card No. 6	Contains decade counting and decoding for hours digit.	Card rack-mates with connector J6-Ref. Drawing A746-0-1004.
Card No. 7	Contains decade counting and decoding for tens of hours digit.	Card rack-mates with connector J7-Ref. Drawing A746-0-1004.
Card No. 8	Contains decade counting and decoding for hundreds of hours digit.	Card rack-mates with connector J8-Ref. Drawing A746-0-1004.
Power Supply	Converts 115VAC input to +15 volts for logic and +28 volts for display.	Card rack-across through rear dust cover-right third of unit Ref. Drawing AS702.
TB1-TB5	Contains diode gating for internal-external set and functions-TB1 contains diodes D1-D5, TB2-D6-D10 etc. (ref. Drawing A746-0-1002)	Mounted to power supply chassis Ref. Drawing AS702, AS703.
TB6	Input-output barrier strip.	Mounted to rear dust cover Ref; Drawing AS708.
S1-S12	Control switching. See section II function of controls.	Front panel.

cont.

DS1-DS8	Display units	Front panel
F1	1/2 Amp fuse	Front panel

SECTION 4
PARTS LISTING

Suggested Spare Parts

Introduction

This section contains information for ordering replacement parts for the Models A746 and A746-1 Elapsed Time Display units.

Replacement parts are listed in alpha-numeric order according to reference designations. Detailed information on a part used more than once in the equipment is listed opposite the first reference designation referring to that part.

The following information is included in the replaceable parts table:

1) Reference designator
2) Full Description of the part.
3) Logitek part number
4) Total quantity used in the instrument (TQ-column.
5) Recommended spare quantity for complete maintenance during one year of isolated service (RS-column)

Spare Parts Kit

Spare parts kit no. PK-746 consists of recommended spares included in Table I.

Ordering Information

Address order or inquiry for a replacement part to:

Logitek, Inc.
42 Central Drive
Farmingdale, New York

When ordering specify the following information for each part:

1) Model and/or modification number of instrument.
2) Logitek, Inc. part number.
3) Circuit Reference Designator.
4) Description.

When ordering parts not listed in the Tables, give a complete description of the part and include its function and location.

TABLE I

REPLACEABLE PARTS A746-0 & A746-1

REF SYM.	DESCRIPTION	MANUFACTURER	LOGITEK #	TQ	RS
M1	Buffer Amp-A746-0	Logitek	SM574	1	1
*M1	Buffer Amp-A746-1	Logitek	SM583	1	1
M2	And - 3 Input	Logitek	SM581	1	1
M3	Flip-Flop-Gen. Pur.	Logitek	SM576	20	2
M4	Nand - Dual 2 input	Logitek	SM578	27	3
M5	Nand - Dual 2 input	Logitek	SM585	1	1
M6	Nand - 3 input	Logitek	SM575	1	1
M7	Emitter-Follower, PNP	Logitek	SM535	14	2
M8	Isolator-External Set	Logitek	SM501	7	1
M9	See M7				

cont.

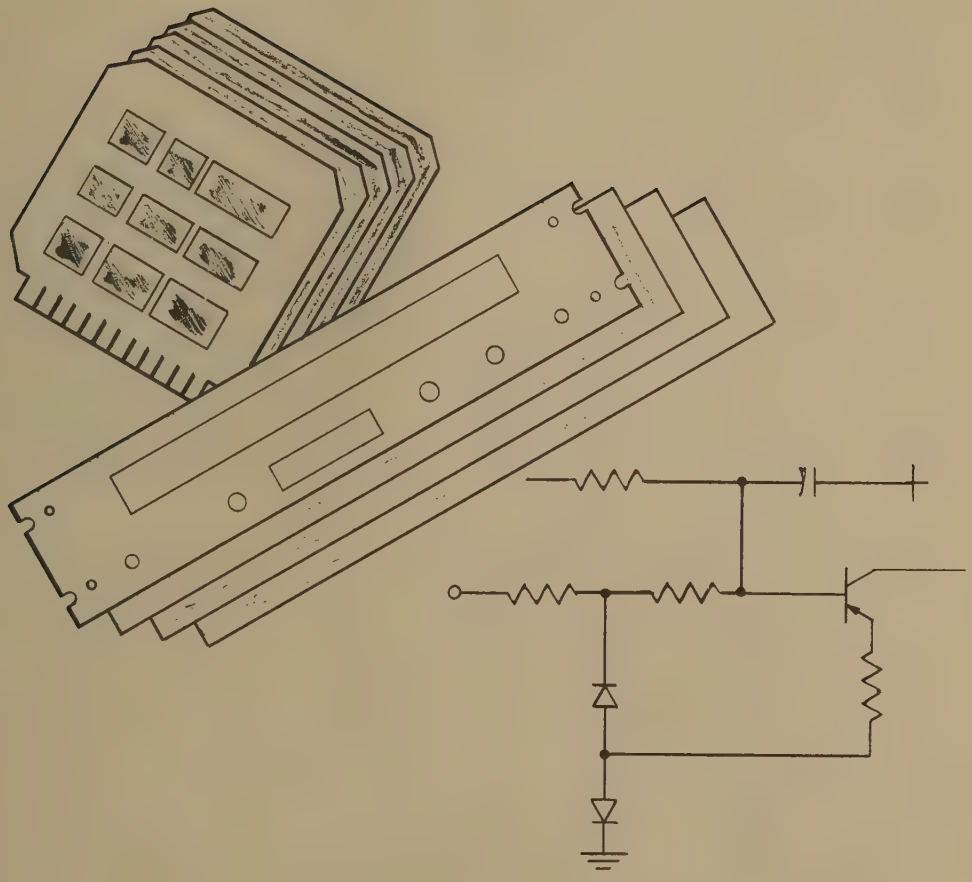
REF.SYM.	DESCRIPTION	MANUFACTURER	LOGITEK#	TQ	RS
M10	See M3				
M11	See M4				
M12	See M2				
M13	See M3				
M14	See M4				
M15	See M3				
M16	See M4				
M17	And-2 input	Logitek	SM580	14	2
M18	See M17				
M19	Flip-Flop, Gen. Pur.	Logitek	SM576-2	7	1
M20	See M4				
M21	BCD Converter	Logitek	SM582	7	1
M22	Inverter, Dual	Logitek	SM586	12	2
M23-M25	Inverter, Dual	Logitek	SM577	15	3
M26	See M22				
M27	See M7				
M28	See M8				
M29	See M7				
M30	See M3				
M31	See M4				
M32	See M12				
M33	See M3				
M34	See M4				
M35	See M17				
M36	See M17				
M37	See M19				
M38	See M4				
M39	See M21				
M40-M43	Inverter	Logitek	SM579	8	1

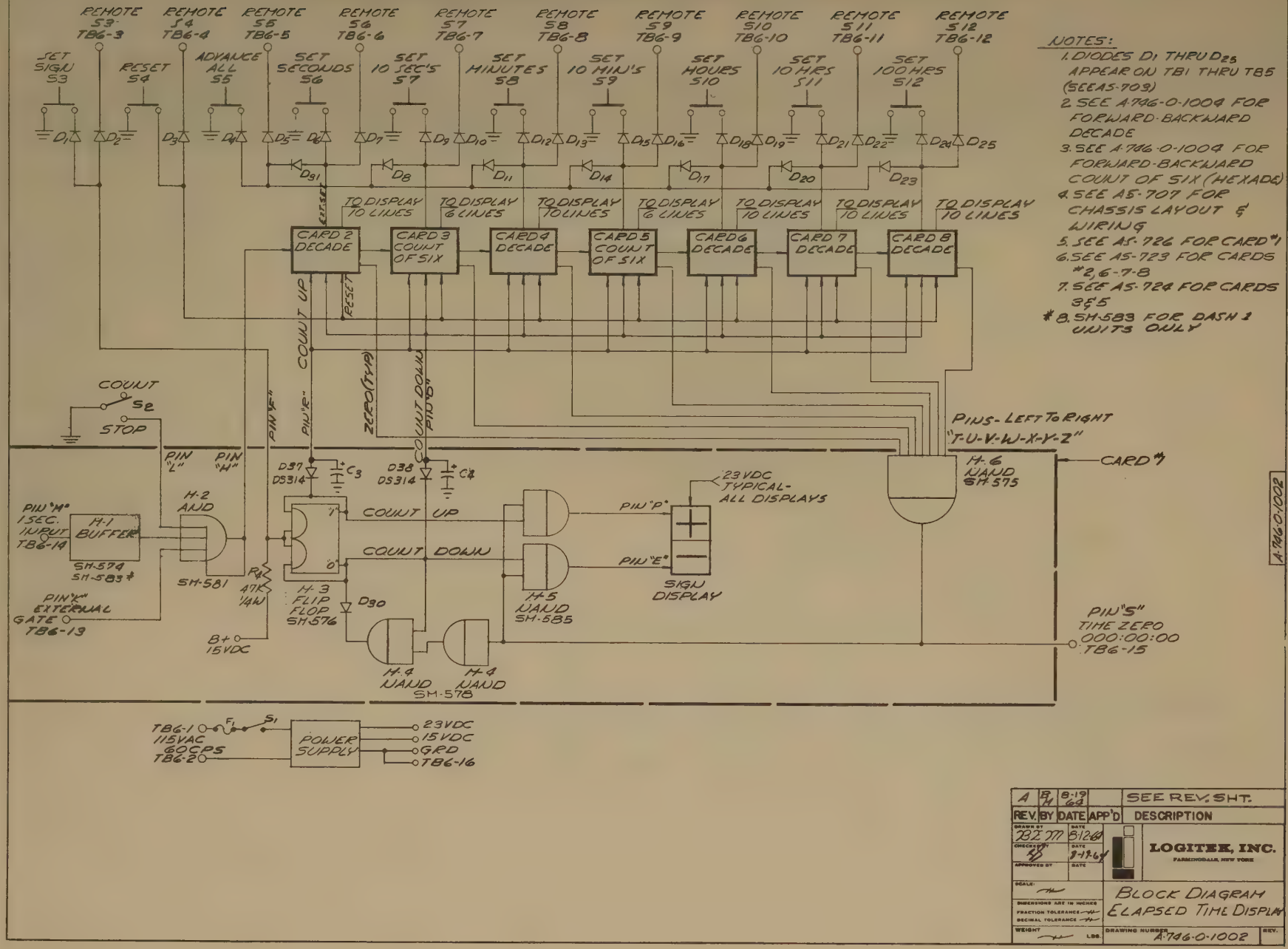
cont.

REF. SYM.	DESCRIPTION	MANUFACTURER	LOGITEK #	TQ	RS
M44	See M22				
C1, C2	Capacitor-Electrolytic 1500 MFD-50 VDC (REF A746-0-1005)	Mallory		2	1
C3, C4	Capacitor .027 MFD-35 VDC (REF-AS726)	Sprague 150 D		2	1
C5-C7	Capacitor 1 MF 35 VDC	Sprague 109 D		3	1
D1-D25	Diode (REF. AS703)		DS314	40	10
D26-D29	See D1-D25 (REF. AS726)				
D30-D32	See D1-D25 (REF. AS724)				
D36-D40	See D1-D25				
DS1	Lamp-Display		746-1819	64	7
E1-E5	Terminals	Cambion 4870-1-0519		5	2
F1	Fuse Cartridge 1/2 Amp	Buss		1	5
R1	10 Ohms 3 WWW (REF. - AS701)	Ohmite 4361		1	1
R2	75 Ohms 10 W, variable (REF. -AS702)	Ohmite 1011		1	1
R3	560 Ohms 1 W, carbon (REF. AS701)			1	1
R4	47 K 1/4 W carbon			8	1
R5	See R4				
R6	See R4				
Card 1	Input & sign logic	Logitek	AS726C	1	1
Cards 3&5	Hexade board	Logitek	AS725C	2	1
Cards 2, 4, 6, 7, 8.	Decade board	Logitek	AS723C	5	2
S3-S12	Switch-Push Button	Grayhill 30-3		10	2
S1-S2	Switch-Toggle	Cutler Hammer CH 8280 K16		2	1
T1	Transformer	Triade F-45X		1	1

SECTION 5

MANUFACTURING DRAWINGS





NOTES:

1. DIODES D1 THRU D25 APPEAR ON TB1 THRU TB5 (SEE AS-703)
2. SEE A-746-0-1004 FOR FORWARD-BACKWARD DECADE
3. SEE A-746-0-1004 FOR FORWARD-BACKWARD COUNT OF SIX (HEXADE)
4. SEE AS-707 FOR CHASSIS LAYOUT & WIRING
5. SEE AS-726 FOR CARD #1
6. SEE AS-723 FOR CARDS #2, 6-7-8
7. SEE AS-724 FOR CARDS 3 & 5
8. # SM-583 FOR DASH 1 UNITS ONLY

A-746-0-1002

REV.	BY	DATE	APP'D	DESCRIPTION
A	BM	8-19-63		SEE REV. SHT.

DRAWN BY: RZ TM DATE: 8/12/63
CHECKED BY: DATE:
APPROVED BY: DATE: 9-17-63

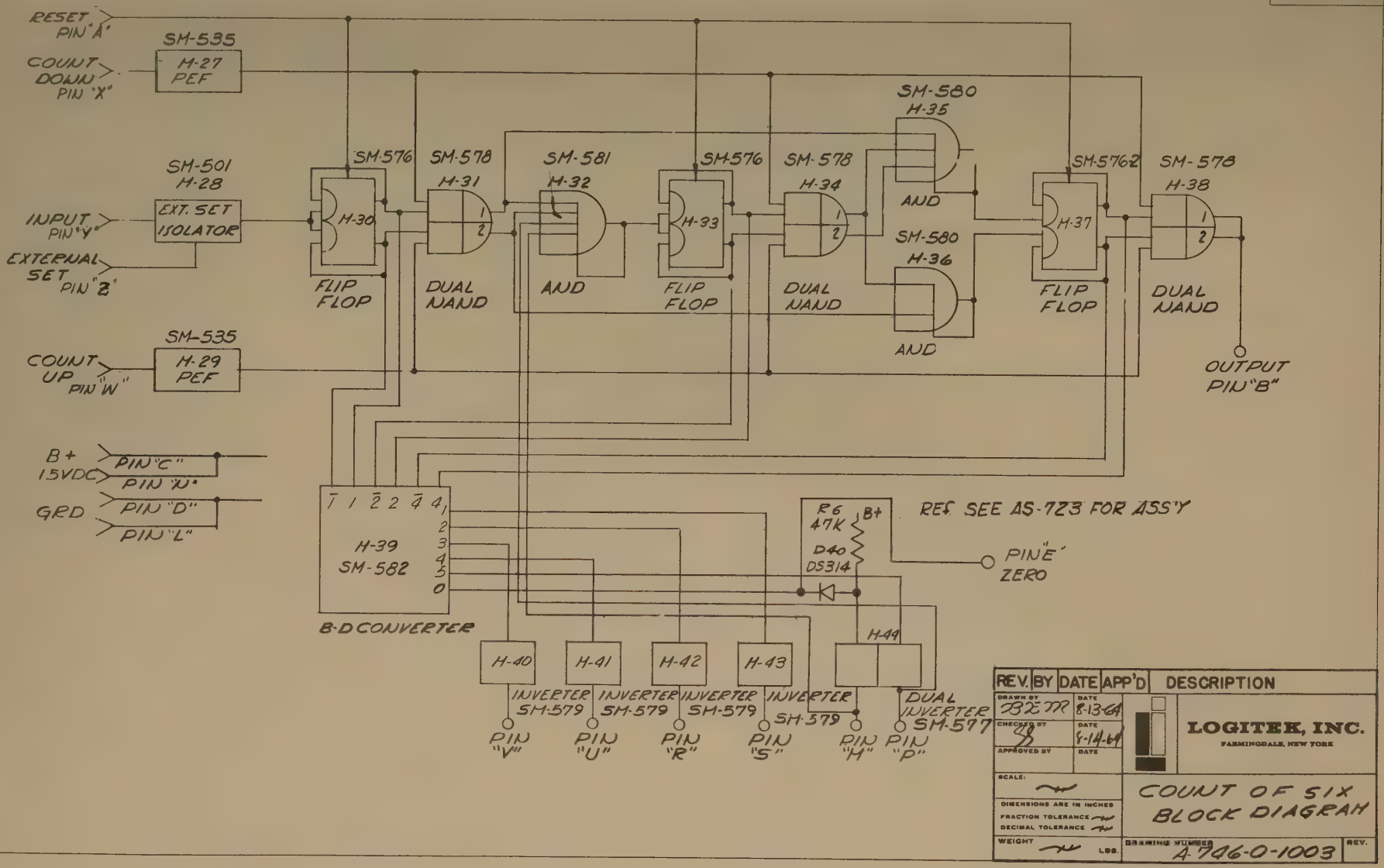
LOGITEK, INC.
PARSIPPANY, NEW JERSEY

SCALE:
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE
WEIGHT LBS.

BLOCK DIAGRAM ELAPSED TIME DISPLAY

DRAWING NUMBER A-746-0-1002 REV.

A746-0-1003



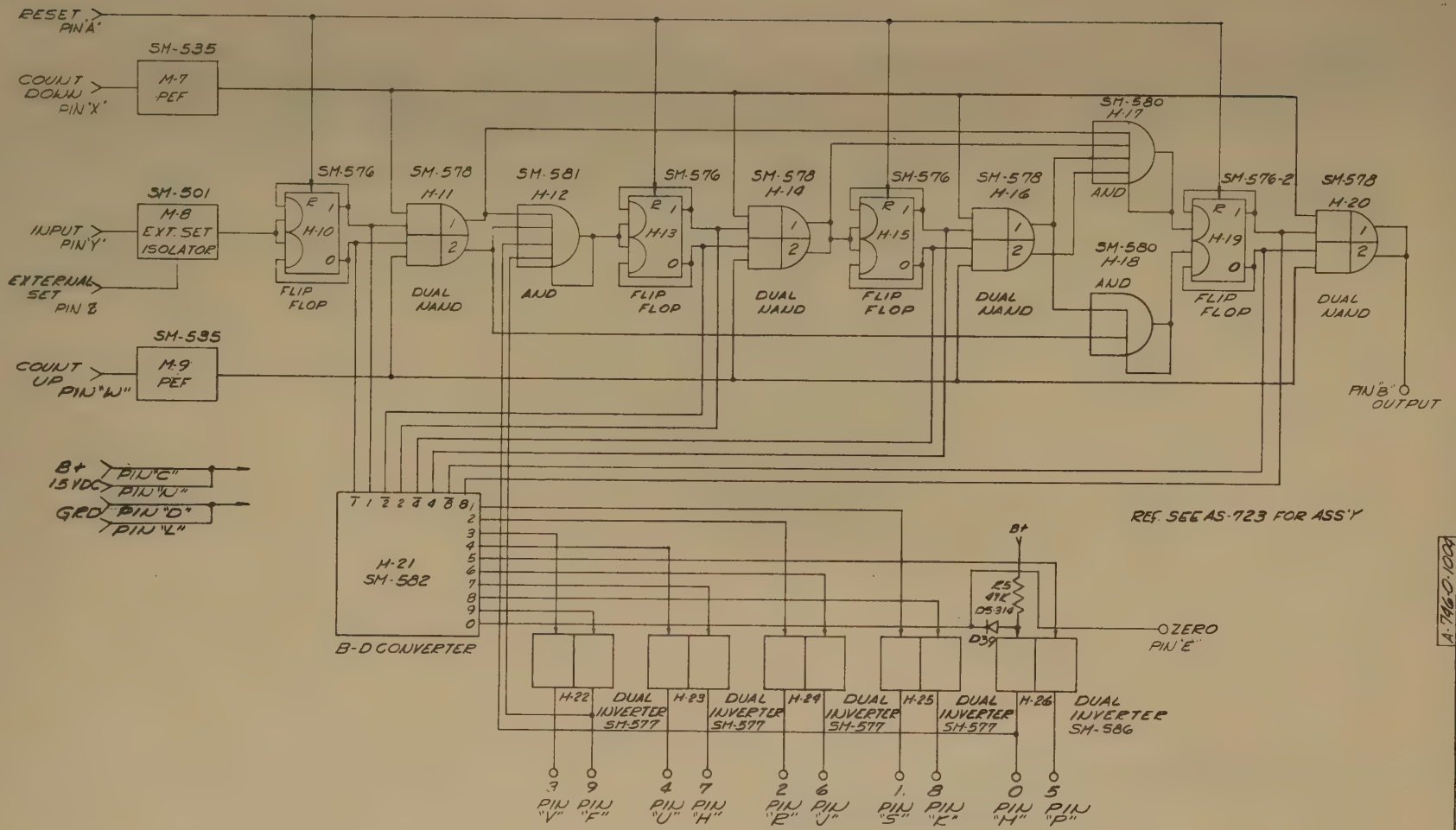
REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY: [illegible] DATE: 8-13-69
CHECKED BY: [illegible] DATE: 8-14-69
APPROVED BY: DATE:
SCALE:
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE
WEIGHT LBS.

LOGITEK, INC.
FARMINGDALE, NEW YORK

COUNT OF SIX BLOCK DIAGRAM

DRAWING NUMBER A-746-0-1003 REV.



REV.	BY	DATE	APP'D	DESCRIPTION
A	BH	8-18-1964		SEE REV. SHT. 103

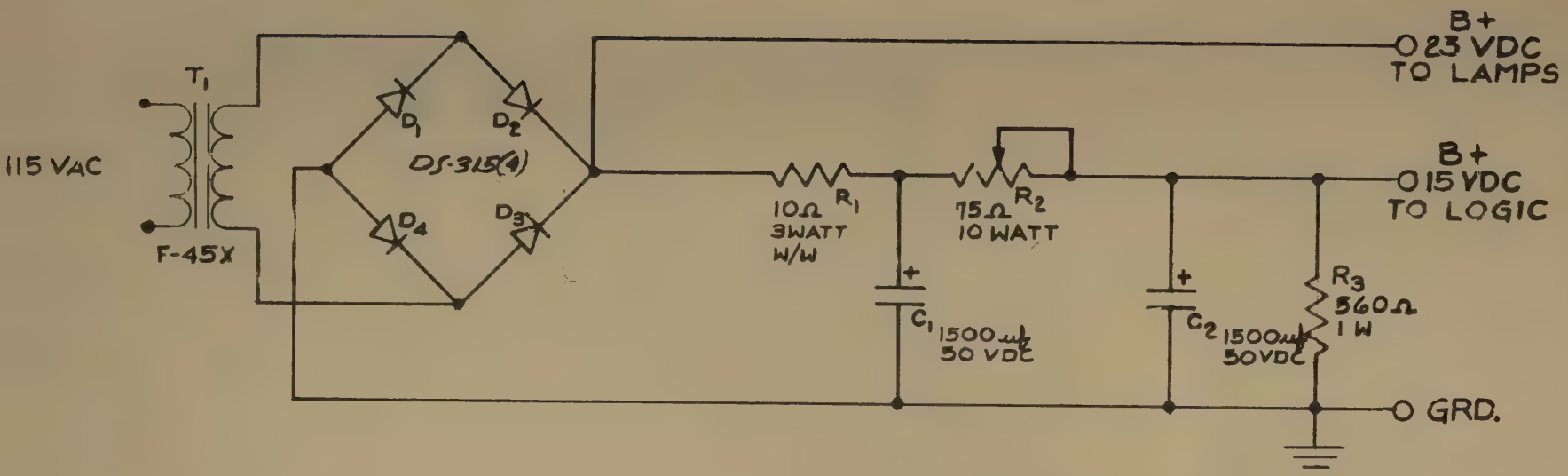
DRAWN BY BEM	DATE 8-13-64
CHECKED BY	DATE 8-19-64
APPROVED BY	DATE
SCALE:	
DIMENSIONS ARE IN INCHES	
FRACTION TOLERANCE	
DECIMAL TOLERANCE	
WEIGHT LBS	

LOGITEK, INC.
PARSIPPANY, NEW YORK

FORWARD-BACKWARD DECADE

DRAWING NUMBER A-746-0-1004 REV. A

A-746-0-1004



REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY: BEM	DATE: 7-9-64
CHECKED BY:	DATE: 7-28-64
APPROVED BY:	DATE: 7/64
SCALE:	
DIMENSIONS ARE IN INCHES	
FRACTION TOLERANCE	
DECIMAL TOLERANCE	
WEIGHT LBS.	

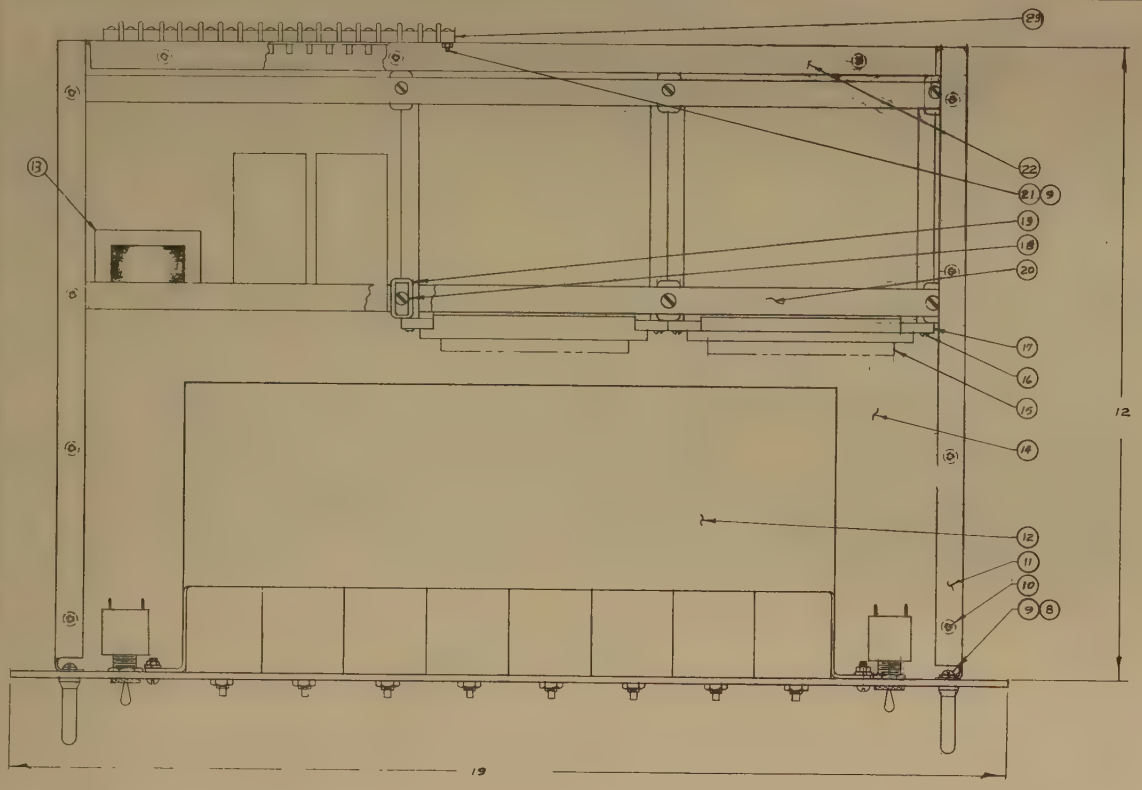
LOGITEK, INC.
FARMINGDALE, NEW YORK

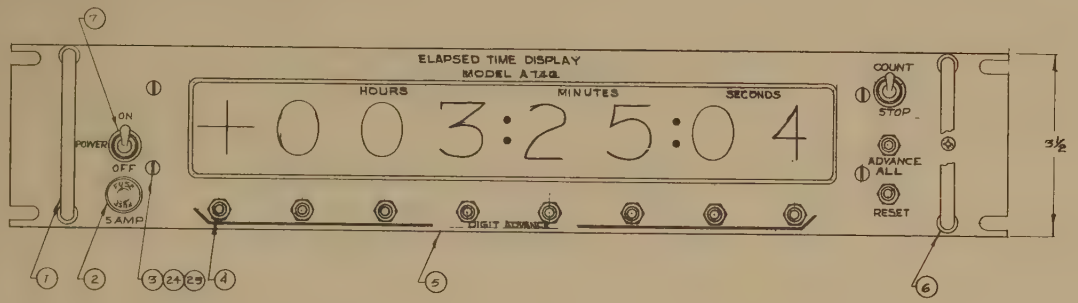
POWER SUPPLY SCHEMATIC

DRAWING NUMBER A-746-0-100.5 REV.

FSCM 15420

ME-610





BILL OF MATERIALS

PC #	QTY	PART NO	DESCRIPTION	VENDOR	MATERIAL
1	2	H-9168	HANDLE	BUD RADIO	BRASS ½ DIA
2	1	HJM	FUSE HOLDER	FUSETRON	
3	4	8-32 ⅝ LG.	R'D H'D SCREW	ALLMETAL	SST.
4	10	30-3	PH B. SWITCH	GRAYHILL	
5	1	ME-604	FRONT PANEL		⅛ THK ALUM.
6	4	1211-1	FERRULE	CAMBION	BRASS
7	2	8280 K16	S.P.S.T. SWITCH	H SMITH	
8	4	#6-L	SPLIT LK WASH.	ALLMETAL	SST.
9	6	6-32 ⅜ LG.	R'D H'D SCREW	ALLMETAL	SST.
10	32	CLS-440-1	PEM NUT (4-40)	PEM ENG.	SST.
11	2	ME-603	SIDE PLATE		.040 THK ALUM.
12	1	#20-8	READ OUT	I.E.E. INC.	
13	1	F-45 X	TRANSFORMER	TRIAD	
14	2	ME-606	TOP & BOT. PLATE		.040 THK ALUM.
15	12	KE 225	CONNECTOR	WINCHESTER	
16	56	#4-40 ⅜ LG	RD. HD SCREW	ALLMETAL	SST
17	24	8-301-51F	CARD GUIDES	A.D.C.	
18	32	8-102-312	SPACERS	A.D.C.	
19	8	ME-608	GUIDE RODS		BRASS ¼ DIA.
20	4	ME-607	MTG BRK'T		.040 THK ALUM
21	2	#6-32	NUT	ALLMETAL	
22	1	ME-605	BACK PLATE		.040 THK ALUM.
23	1	#28F872	BARRIER STRIP	CINCH JONES	
24	4	8-32	NUT (HEX.)	ALLMETAL	SST.
25	4	#8-L	SPLIT LK WASH.	ALLMETAL	SST.

REV	BY	DATE	APP'D	DESCRIPTION
	F.K.	7/16/62		

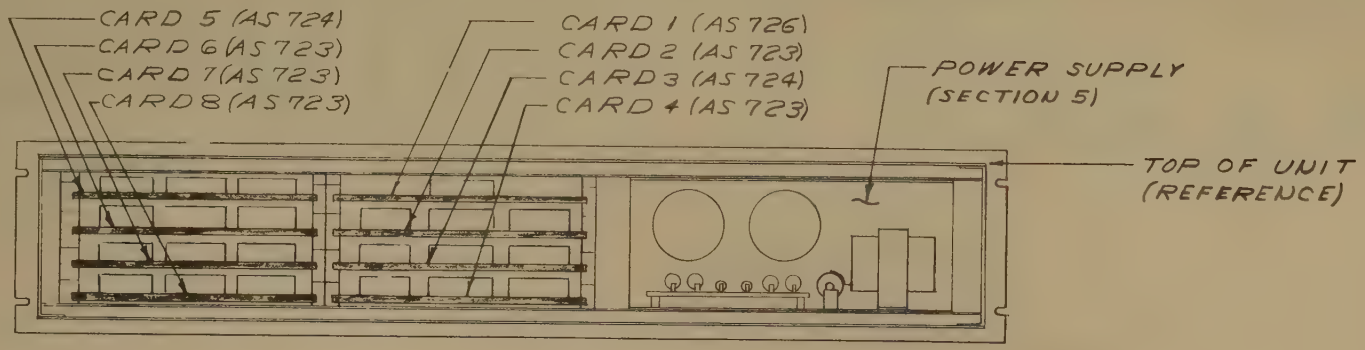
LOGITEK, INC.

FULL

ELAPSED TIME DISPLAY MECHANICAL ASS'Y (A746)

ME-610

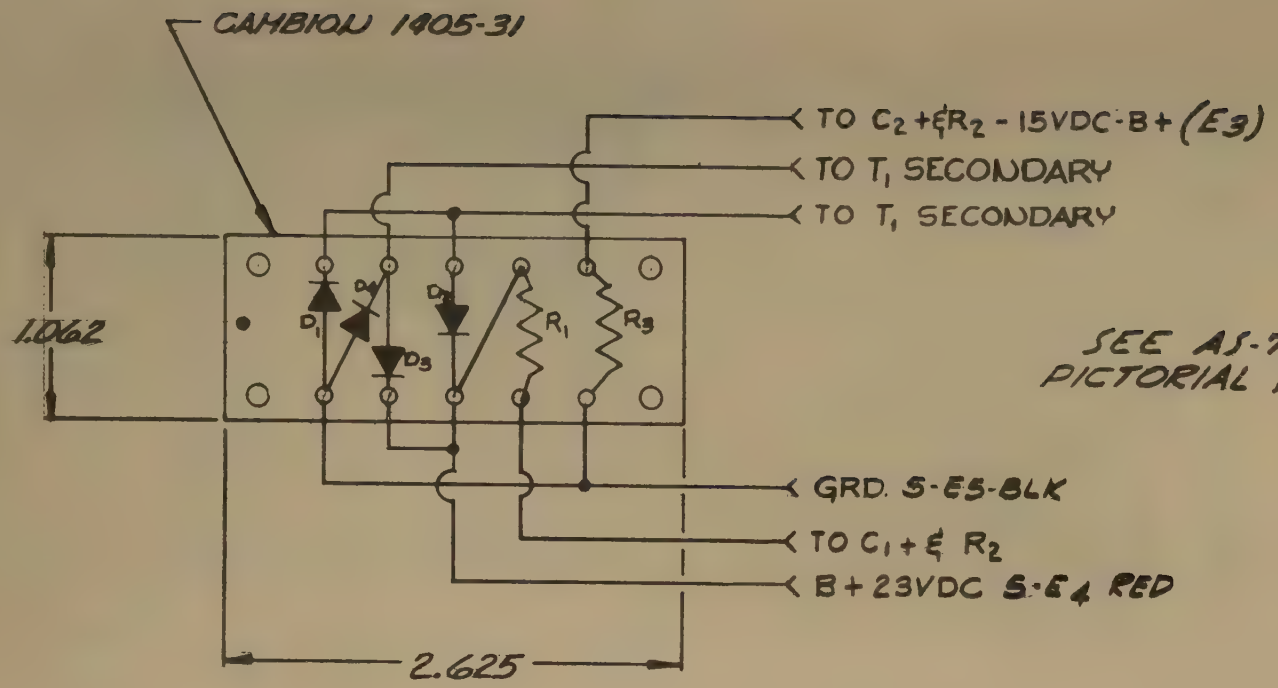
SHEET 1 OF 2



REAR VIEW

REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY J.OGOZALEK	DATE 8-19-64
CHECKED BY	DATE
APPROVED BY	DATE
SCALE: N.T.S.	LOGITEK, INC.
DIMENSIONS ARE IN INCHES FRACTION TOLERANCE DECIMAL TOLERANCE	REAR VIEW ELAPSED TIME DISPLAY A-746
WEIGHT LBS.	DRAWING NUMBER ME610 REV.



SEE AS-702 FOR PICTORIAL VIEW OF WIRING

NOTES:

D_1 - D_5 - DS-318

R_1 - 10Ω 3W WW

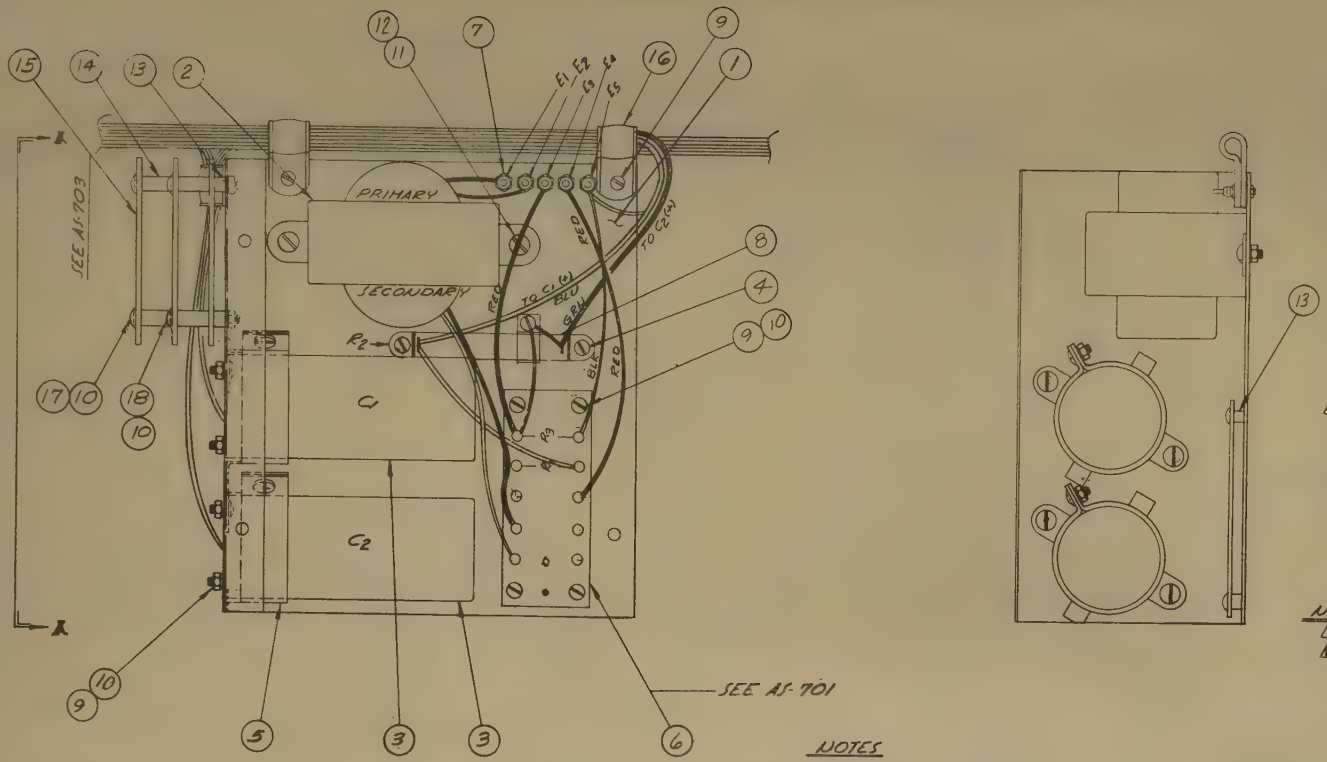
R_3 - 560Ω 1W CARBON

WIRING VIEW OF SECTION 5 SHOWN

REV.	BY	DATE	APP'D	DESCRIPTION
A	BEM	8-8-64	WJC	SEE REVISION SHT. 103

DRAWN BY BEM	DATE 7-21-64	LOGITEK, INC. FARMINGDALE, NEW YORK
CHECKED BY W.J.C.	DATE 8-4-64	
APPROVED BY	DATE	
SCALE: FULL		ASS'Y - DETAIL (SUB) POWER SUPPLY
DIMENSIONS ARE IN INCHES FRACTION TOLERANCE ± DECIMAL TOLERANCE		
WEIGHT LBS.	DRAWING NUMBER AS-701	REV. A

FSCM 15420

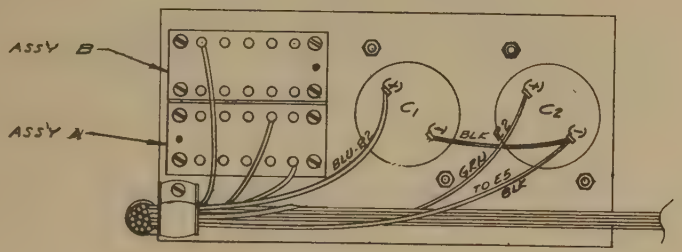


LIST OF MATERIAL
ONE UNIT

ITEM	QTY	DESCRIPTION
1	1	ME-538
2	1	F-45X - TRIAD - XFORMER
3	2	WP-068 MALLORY
4	9	4-40 X 1/4 LG SCREW
5	2	17893 C-D-E
△ 6	2	1905-31 CAMBION
7	5	4870-1 CAMBION
8	1	75Ω 10W VARIABLE RES.
9	8	4-40 X 3/8 LG SCREW
10	16	4-40 NUT S.ST.
11	2	6-32 X 3/16 S.ST. SCREW
12	6	6-32 S.ST. NUT
13	8	SPACER 3/16 DIA. X 1/8 LG
14		SPACER 3/16 DIA X 3/16 LG
△ 15	5	1311-31 CAMBION
16	2	3/16-6R WECKESSER
17	4	4-40 X 3/4 LG SCREW
18	4	4-40 X 1 1/4 LG SCREW
19	1	1/2-6R WECKESSER

NOTES:
△ SEE AS-701
△ SEE AS-703 & AS-711

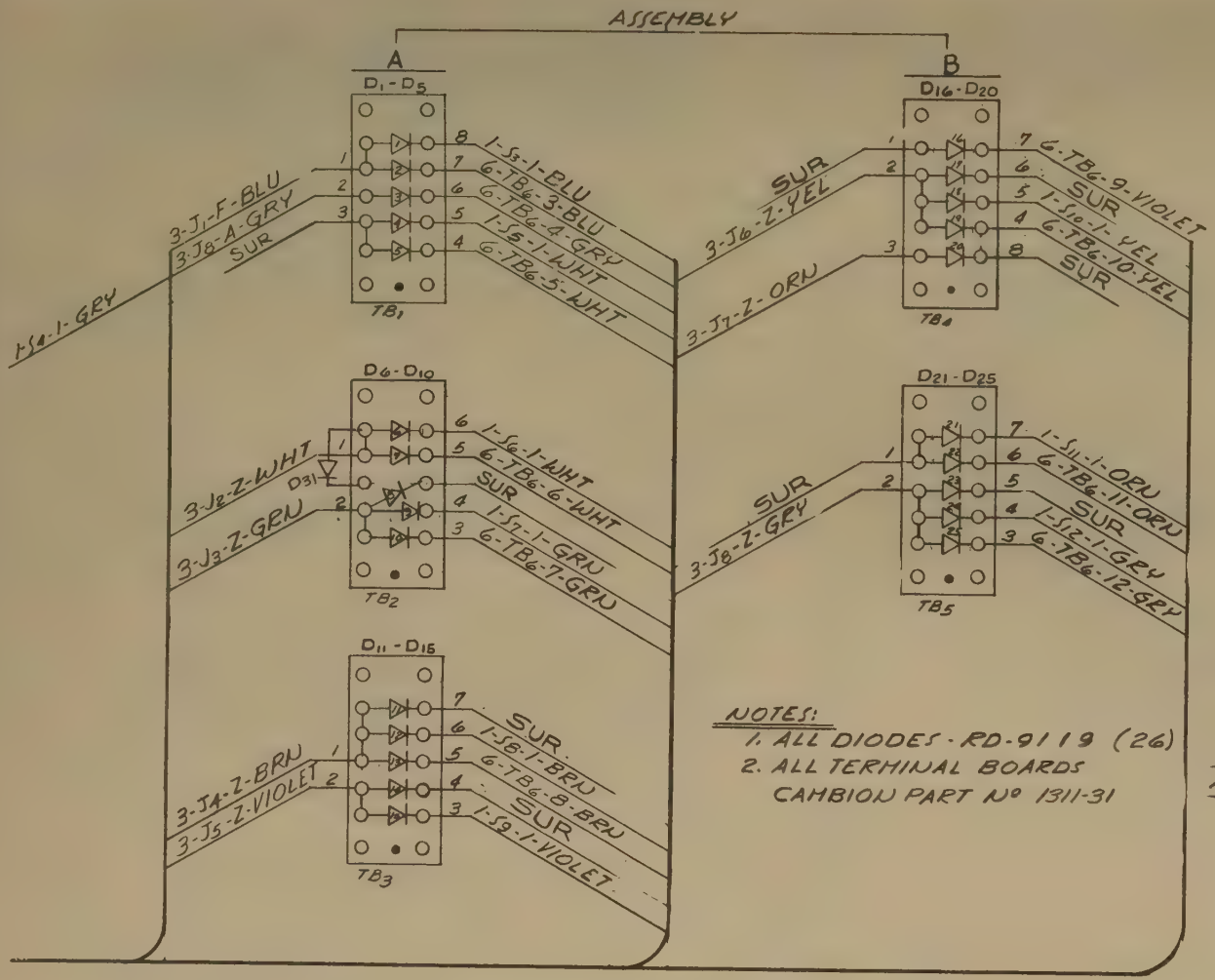
NOTES
1. WIRING LEGEND
E_1 - 1-F_1-1-BLK
E_2 - 6-TB_4-2-BLK
E_3 - 3-J_8-N-RED
E_4 - 2-DS_1-DS_8-COMMON-RED
E_5 - 3-J_8-L-BLK



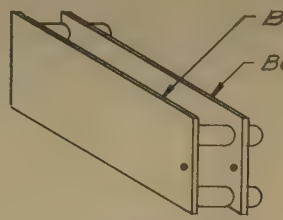
VIEW A-A

REV.	BY	DATE	APP'D	DESCRIPTION
DRAWN BY J. OBODZALEK		DATE 7-22-64		LOGITEK, INC. FARMINGDALE, NEW YORK
CHECKED BY		DATE		
APPROVED BY		DATE		
SCALE: FULL				POWER SUPPLY ASSEMBLY A-746
DIMENSIONS ARE IN INCHES FRACTION TOLERANCE DECIMAL TOLERANCE				
WEIGHT LBS.				DRAWING NUMBER AS 702 REV.

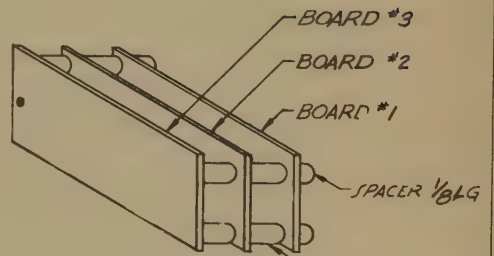
AS 702



NOTES:
1. ALL DIODES - RD-9119 (26)
2. ALL TERMINAL BOARDS CAMBION PART Nº 1311-31



ASSEMBLY "B"



ASSEMBLY "A"

SUR = SURFACE WIRING
FOR SURFACE WIRING SEE AS-711
FOR LOCATION OF BOARD ASSEMBLIES SEE AS-702

REV.	BY	DATE	APP'D	DESCRIPTION
A	BH	8-18-69	WJC	SEE REV. SHT. 103

DRAWN BY BHM DATE 7-21-69
CHECKED BY W.J.C. DATE 8-4-69
APPROVED BY DATE

LOGITEK, INC.
FARMINGDALE, NEW YORK

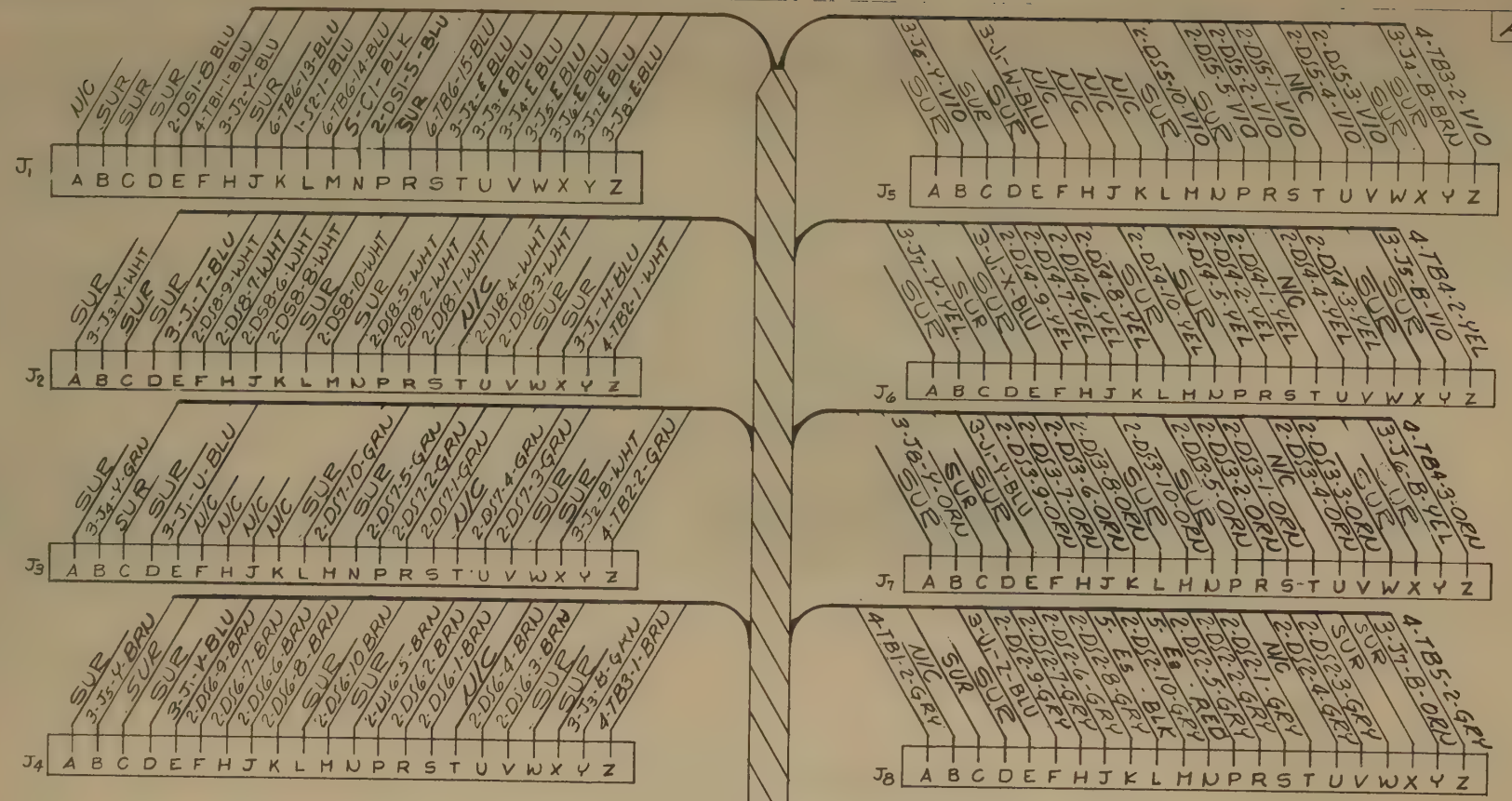
SCALE: FULL
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE ±
DECIMAL TOLERANCE ±
WEIGHT LBS.

ASSY - DETAIL TERMINAL BOARDS

DRAWING NUMBER AS-703 REV. A

SECTION 4

AS-704



NOTES:

1. ALL WIRES #24 AWG
2. WIRING VIEW OF SECTION 3 SHOWN.
3. SUR = SURFACE WIRING SEE AS-709

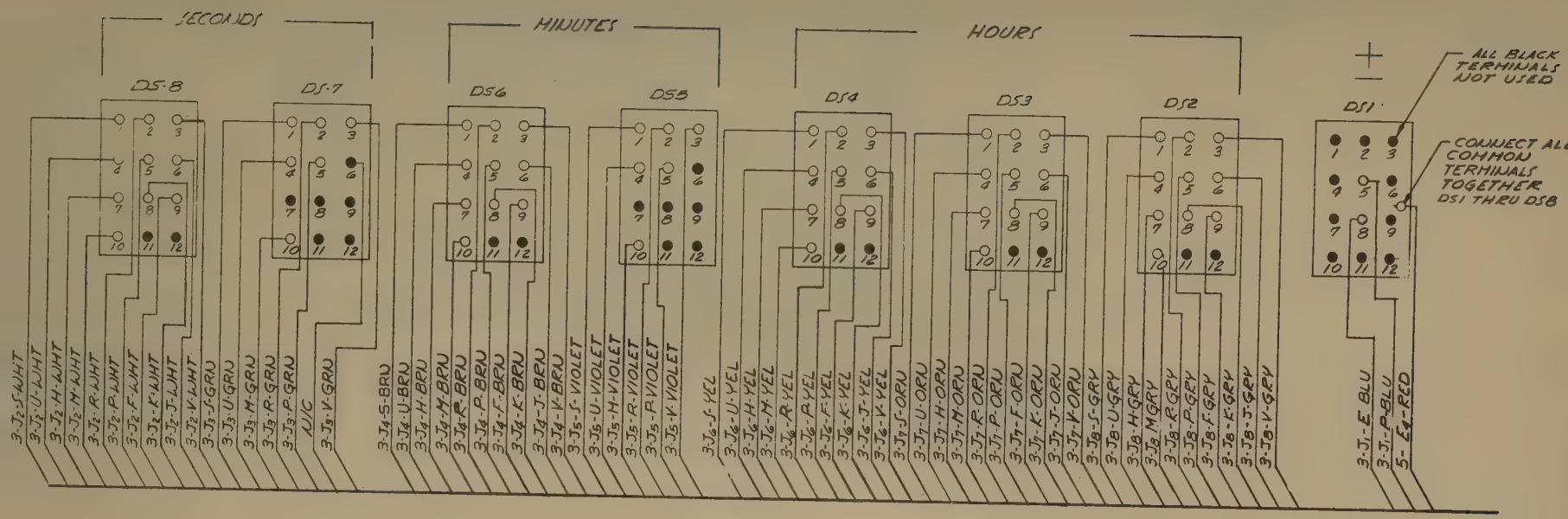
REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY BEM DATE 7/24/69
CHECKED BY W.J.C. DATE 8-V-69
APPROVED BY DATE
SCALE:
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE
WEIGHT LBS

LOGITEK, INC.
FARMINGDALE, NEW YORK

WIRING DIAGRAM
CARD CONNECTORS
A-746

DRAWING NUMBER AS-704 REV.



AS-705

NOTES:
1. USE #24 AWG WIRE THRU-OUT
2. WIRING VIEW SECTION 2 SHOWN

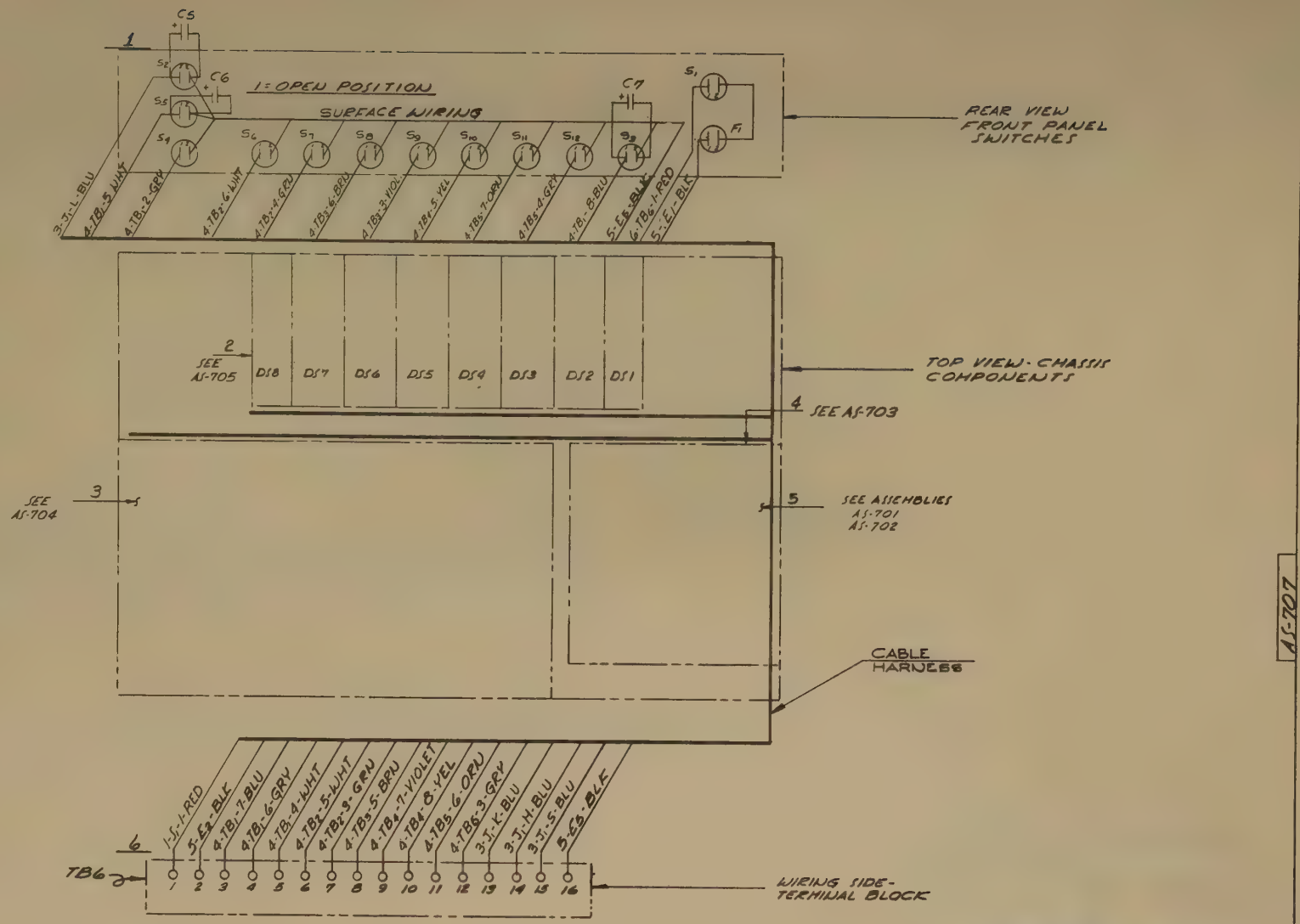
REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY 232-722 DATE 7-29-64
CHECKED BY W.J.C. DATE 8-5-64
APPROVED BY DATE
SCALE: —
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE —
DECIMAL TOLERANCE
WEIGHT

LOGITEK, INC.
FARMINGDALE, NEW YORK

WIRING DIAGRAM
READ OUTS
A-746

DRAWING NUMBER REV.



NOTES:
1. USE 28 AWG WIRE THRU-OUT
2. CAPACITORS C5 THRU C7 ARE 1UF 35 V

REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY 23E7622244 DATE
DESIGNED BY W.J.C. DATE 7-4-66
APPROVED BY DATE
SCALE: NONE
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE ±
DECIMAL TOLERANCE ±
URGENT LBS.

LOGITEK, INC.
PARSIPPANY, NEW YORK

CHASSIS LAYOUT & WIRING A-796

DRAWING NUMBER AS-707 REV V

AS-707

AS-708

WIRING DIAGRAM OF BARRIER STRIP AS VIEWED FROM BACK OF UNIT

REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY: BEM DATE: 7-29-64
CHECKED BY: W.J.C. DATE: 8-4-64
APPROVED BY: DATE:

LOGITEK, INC.
FARMINGDALE, NEW YORK

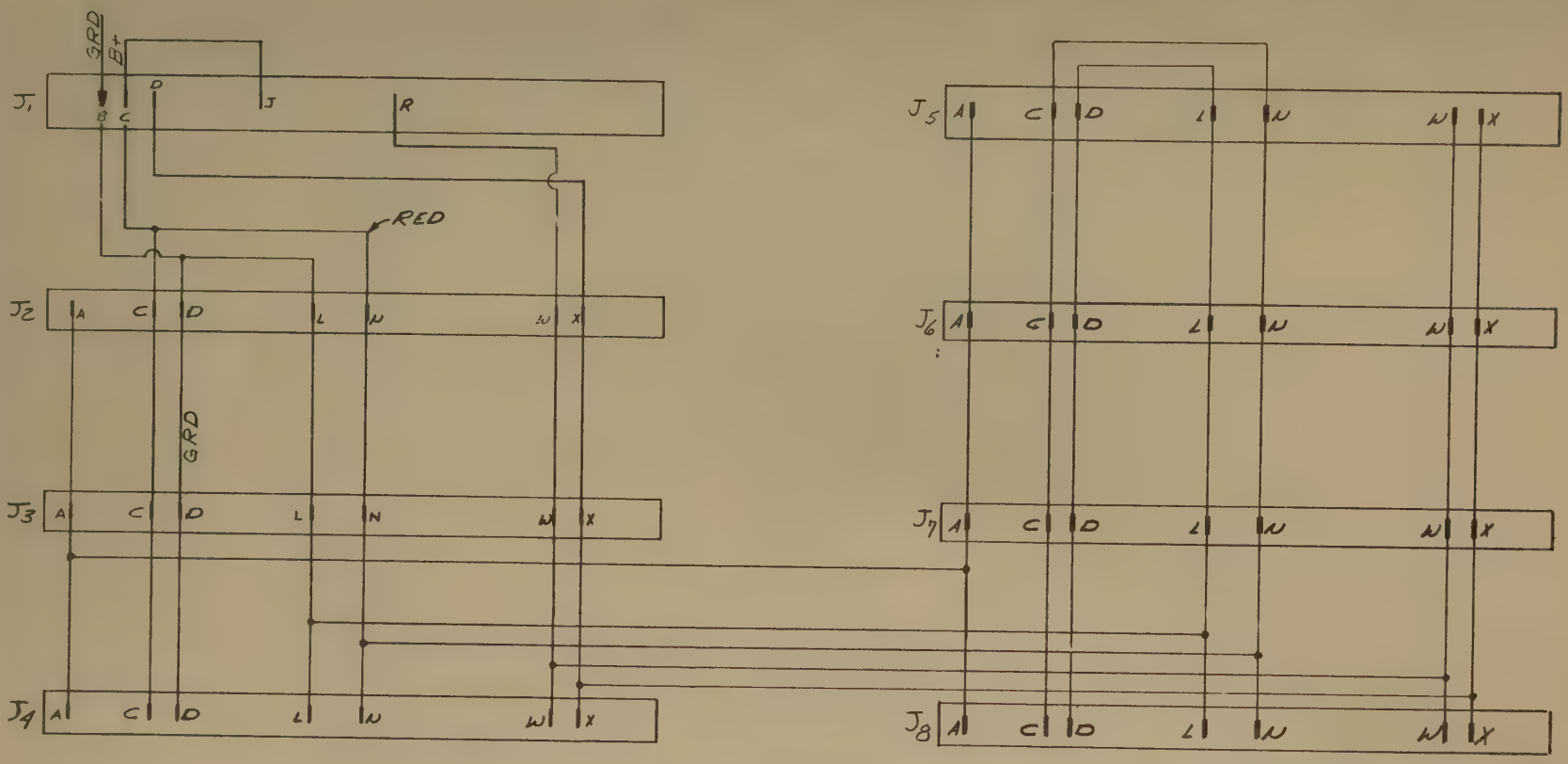
SCALE: FULL
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE
WEIGHT ~ LBS.

EXTERNAL WIRING

DRAWING NUMBER AS-708 REV

This drawing is the property of LOGITEK, INC. and is loaned subject to return upon request. It is not to be reproduced, copied or used in whole or in part as the basis of manufacture or sale of apparatus, devices or parts thereof without written permission.

AS-709



REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY: BEM. DATE:
CHECKED BY: W.J.C. DATE: 8-4-64
APPROVED BY: DATE:

LOGITEK, INC.
FARMINGDALE, NEW YORK

SCALE:

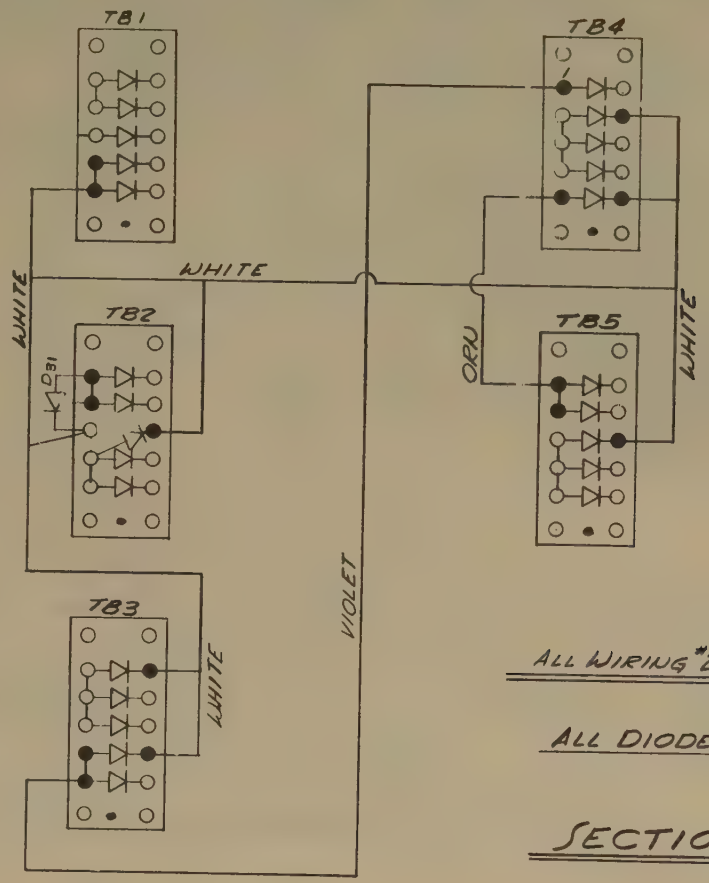
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE

WEIGHT LBS.

SURFACE WIRING SECTION 3

DRAWING NUMBER AS-709 REV.

AS-711



ALL WIRING #24 AWG.

ALL DIODES RD-9119

SECTION 4

REV.	BY	DATE	APP'D	DESCRIPTION

DRAWN BY ZB TZ DATE 7-30
CHECKED BY W J C DATE 8-6-67
APPROVED BY DATE

LOGITEK, INC.
PLEASANTVILLE, NEW YORK

SCALE:

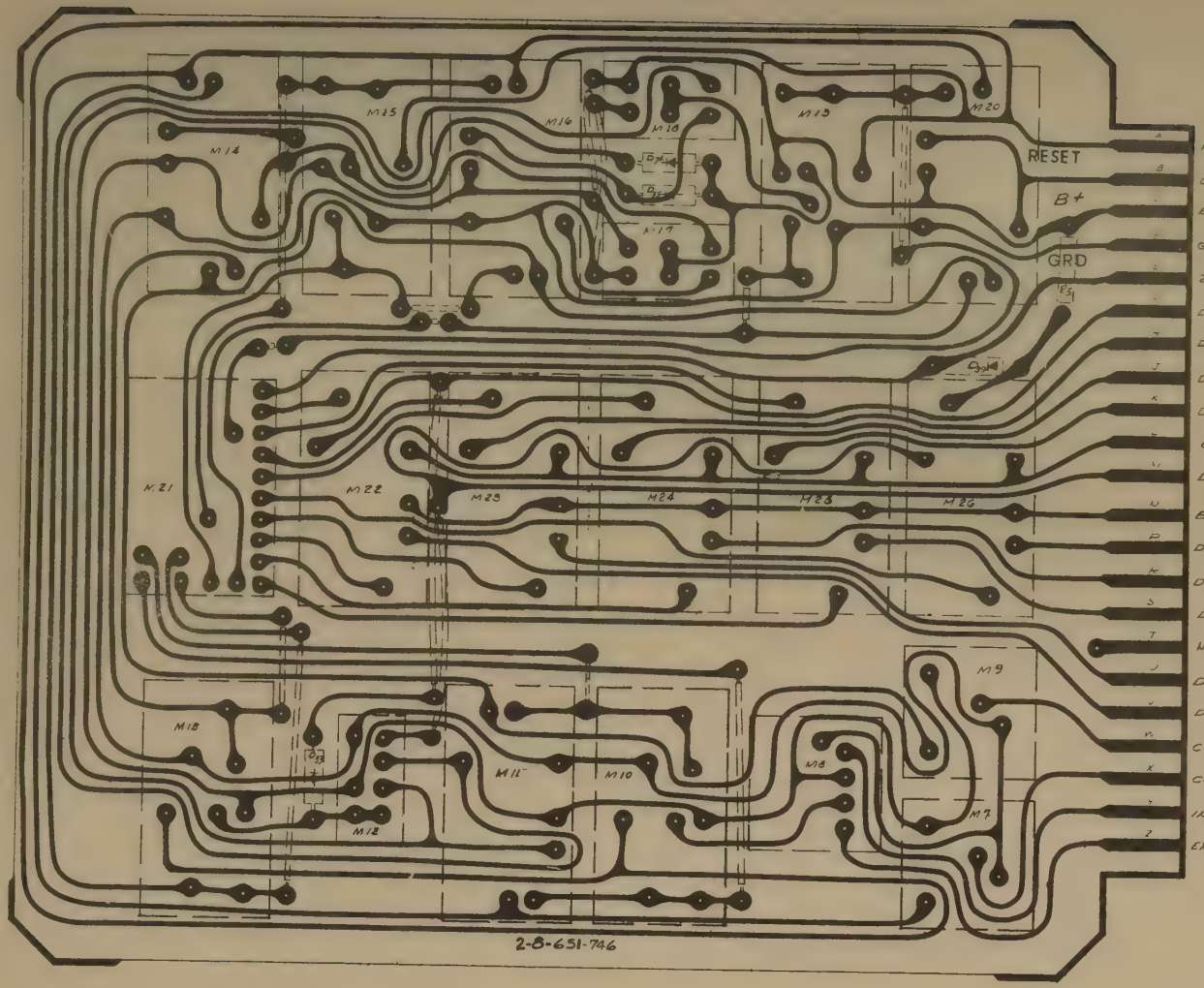
DIMENSIONS ARE IN INCHES
FRACTION TOLERANCE
DECIMAL TOLERANCE

WEIGHT LBS.

SURFACE WIRING
SECTION 4

DRAWING NUMBER AS-711

REV.



2-B-651-746

BOARD LEGEND

SYM NO	SM NO	USE LEADS	VALUE
M8	SM501	ALL	
M10/3/15	SM576	1,2,3,4,5,6,8,9	
M19	SM5-2-2	ALL	
M1,14	SM578	A, C, D, GRD, B+, AB, CD	
M16,20	SM579	A, B, C, D, GRD, B+, AB, CD	
M22,23	SM577	ALL	
M24,25	SM5**	ALL	
M26	SM586	ALL	
M7,M8	SM585	ALL	
M9,M9	SM535	ALL	
M21	SM582	ALL	
M12	SM581	ALL	
D33,34,35			DS 314
D39			DS 316
R5			47K 1/4

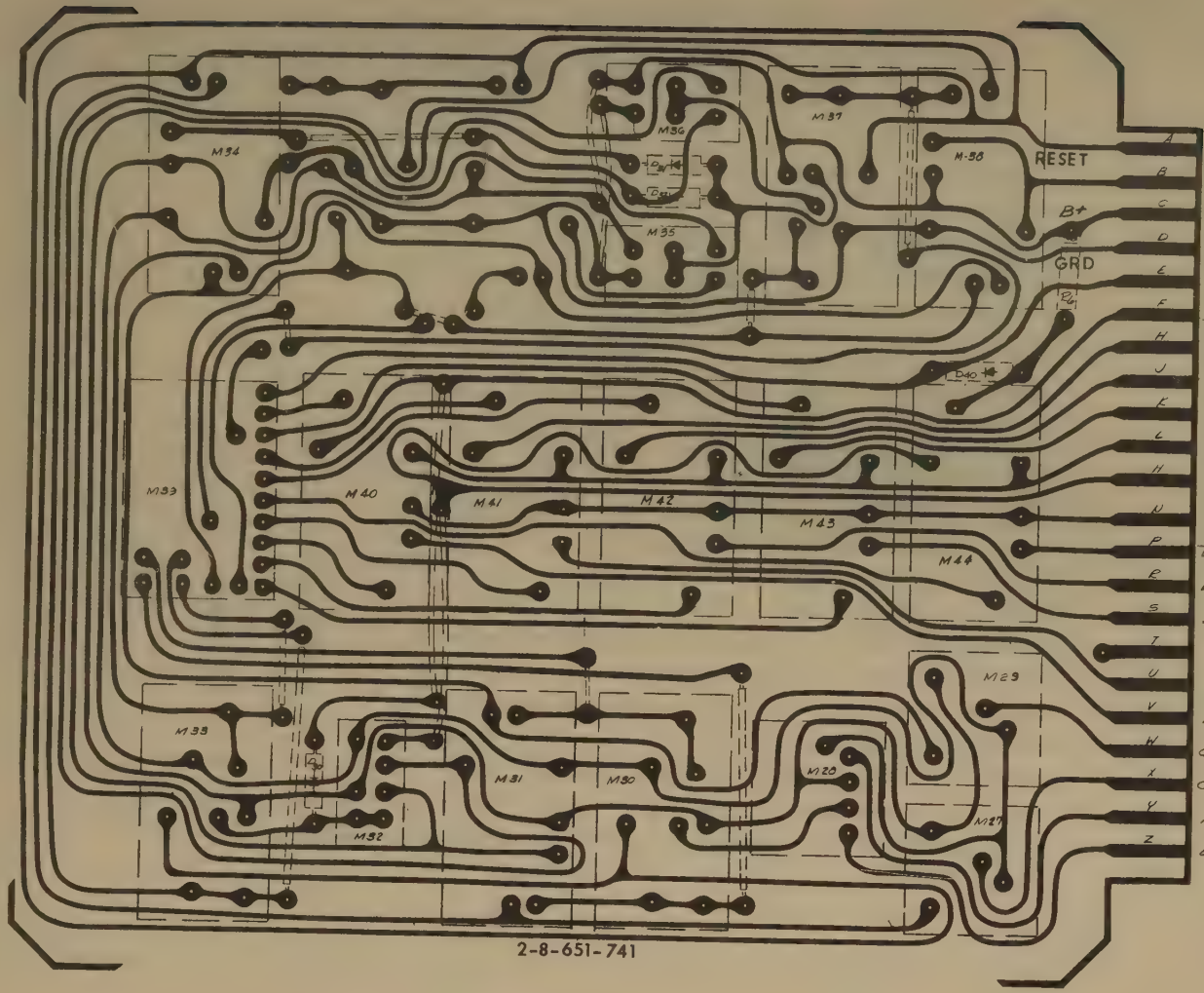
NOTES:

1. USE NEGATIVE NO PC-651
2. BOARDS 2,4,6,7&8 SHOWN
3. SEE AS- FOR BOARDS 9&5
4. SEE AS- FOR BOARD 1
5. SEE A-746-0-1000 FOR BLOCK DIAGRAM OF BOARDS 2,4,6,7&8
6. MODULES TO BE MARKED WITH RESPECTIVE "SM" NUMBERS.

* DISPLAY "5" REFERS TO THE NUMERAL 5 ON THE ASSOCIATED READ OUT UNIT

REV	BY	DATE	APP'D	DESCRIPTION
	JWO	7/6/67		

DRAWN NJC
SCALE 4 to 1
LOGITEK, INC.
PARSIPPANY, NEW YORK
BOARDS 2,4,6,7&8
ETD
A746
AS723
SIZE B
FSCM 15420



2-8-651-741

BOARD LEGEND			
SYM NO.	SM NO.	USE LEADS	VALUE
M28	SM501	ALL	
M30,33	SM576	1,2,3,4,5,6,8,9	
M37	SM576-2	ALL (NITE BRAIL PAD)	
M 37	SM578	A,B,C,D, GRD, B+, AB, CD	
M34	SM578	A,B,C,D, GRD, B+, AB, CD	
M36	SM578	A,B,C,D, GRD B+, AB, CD	
M32	SM581	ALL	
M35,36	SM580	ALL	
M40,41	SM579	ALL	
M42,43	SM579	ALL	
M44	SM577	ALL	
M27,29	SM535	ALL	
M39	SM582	ALL	
D30,31,32	DS314		
D40			DS314
E6			47 E4

NOTES

1 USE NEGATIVE No. PC-651
2 BOARDS 3 & 5 SHOWN
3 SEE BLOCK DIAGRAM No. A-746-0-1003

* DISPLAY 5' REFERS TO THE NUMERAL 5 ON THE ASSOCIATED READ OUT UNIT

REV	BY	DATE	APP'D	DESCRIPTION
	JWO	7/16/64		
	WJC	DATE		
		DATE		

LOGITEK, INC.
PARSIPPANY NEW JERSEY

4 to 1

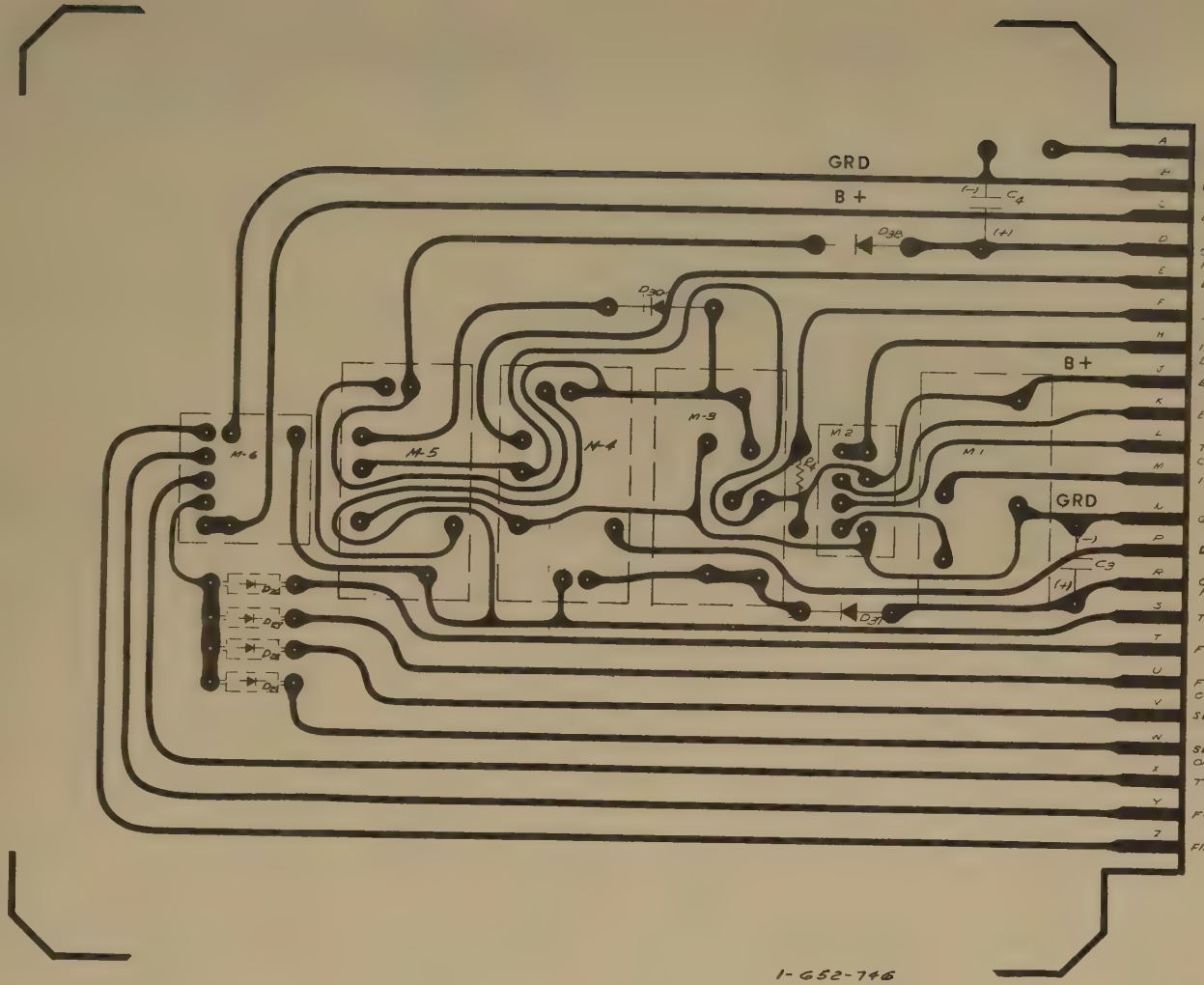
BOARDS 3 & 5
ETD
A746
A3724

DRAWING NUMBER

REV

WEIGHT LBS

FSCM 15420



BOARD LEGEND

UNIT	SMD	USE LEADS	VALUE
M1	SM-574	ALL	
M2	SM-533	ALL	
M3	SM-576	1, 3, 4, 5, 6, 8, 9	
M-4	SM-572	A, B, C, Q, GRD, B+	
M-5	SM-570	A, B, C, D	
M6	SM-575	ALL	
	D26-D30		D-314
	D27-D28		DS-373
	C3-C4		.027 μf
	R4		47K ohm
* M1	SM-583	-1 UNIT ONLY	

NOTES
1. USE NEGATIVE NR PC 652
2. BOARD 1 SHOWN
3. SEE BLOCK DIAGRAM A746-0-1002
4. NEXT ASS'Y AS-723

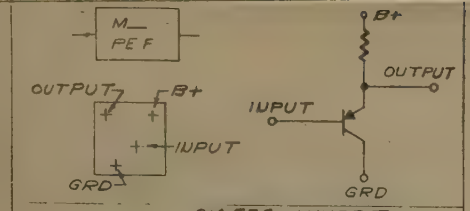
1-652-746

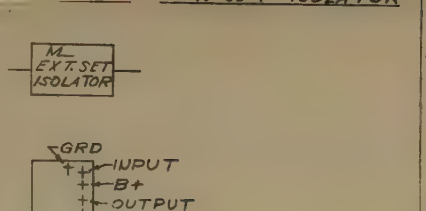
REV.	BY	DATE	APP'D	DESCRIPTION
A		6-28-68	WJL	SEE REV SHT 103
	JWO	7-1-68		

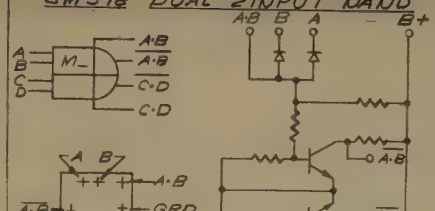
LOGITEK, INC.
PARSIPPANY, NEW JERSEY

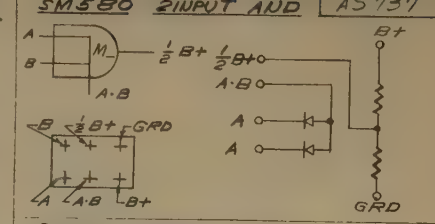
SCALE 4 TO 1
BOARD 1
E T D
A746
AS 726

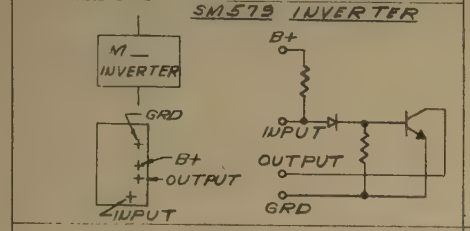
FSCM 15420

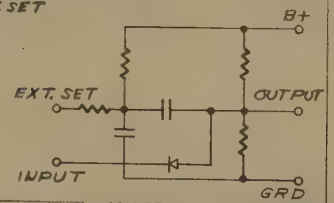


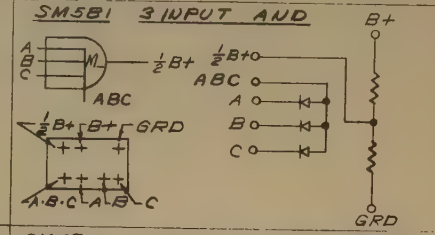


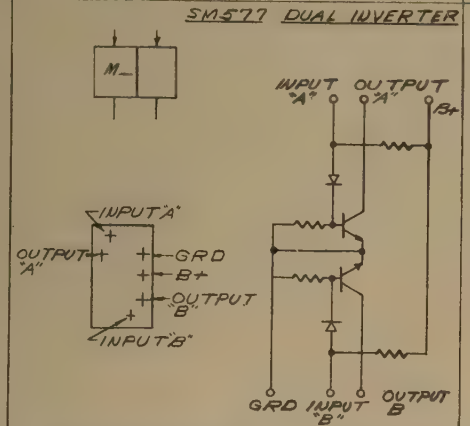


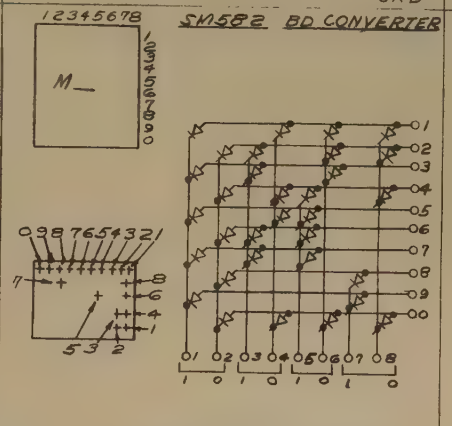


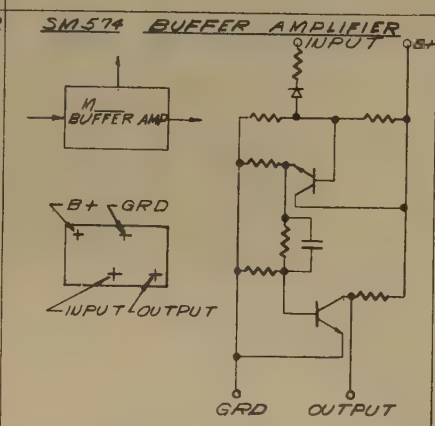


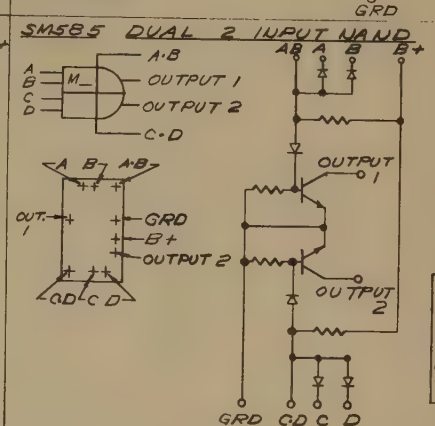


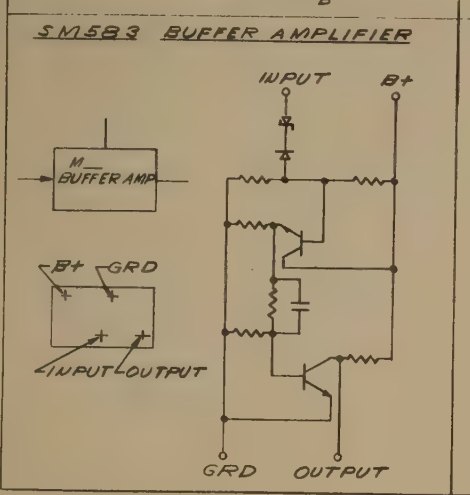


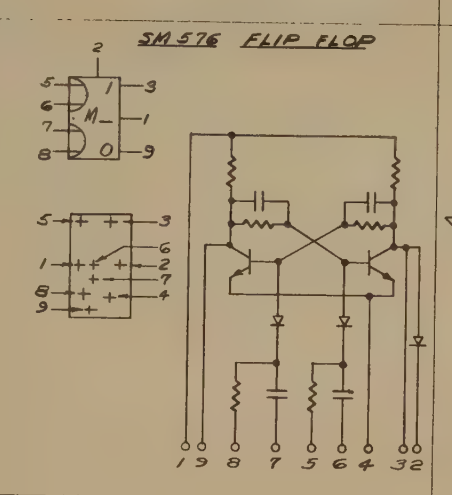


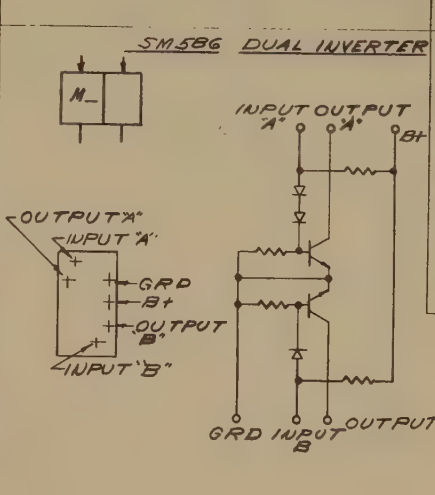


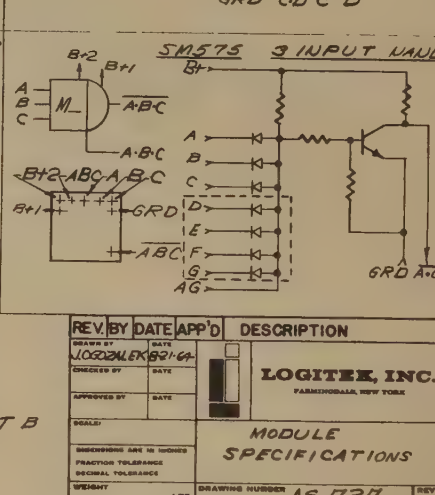












REV.	BY	DATE	APP'D	DESCRIPTION
DRAWN BY J. OSZDALEK		8-21-64		
CHECKED BY		DATE		
APPROVED BY		DATE		
SCALE:				
DIMENSIONS ARE IN INCHES FRACTION TOLERANCE DECIMAL TOLERANCE				
WEIGHT LBS.				

LOGITEK, INC.
FARMINGDALE, NEW YORK

MODULE SPECIFICATIONS

DRAWING NUMBER AS 737 REV.

MANUAL CHANGES

MODELS A746-0 & A746-1
ELAPSED TIME DISPLAY

Change	Symbol	Part No.	Change To	Applicable To
1.	M-22	SM577	*SM586	**Drwg. A-746-0-1004 on all units except serial numbers 9251, 9252, 9253, 9317, 9318,9319, 9405 and 9406.
2.	M-44	SM577	SM586	Drwgs. A-746-0-1003 & AS724, All units.
3.	M-2	SM539	SM581	Drwg. AS726, All units.
4.	M-5	SM578	SM585	Drwg. AS723, All units.
5.	Note 3	AS Blank	AS-724	Drwg. AS723, All units.
6.	Note 4	AS Blank	AS-726	Drwg. AS723, All units

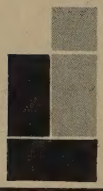
* When re ordering M-22, use new number.

** SM586 may be used as the replacement part to improve the performance of units using SM577 for M-22. (Serial Nos. listed above)

MANUAL CHANGE INFORMATION

Due to Logitek's policy of continual improvement to keep up with the latest electronic developments the following changes have been incorporated on our unit.

Sometimes, due to printing and shipping requirements, we can't get tnese changes into printed manuals immediately Therefore, your manual may contain new change information on following pages. If it does not, your manual is correct as printed.



LOGITEK, INC.

42 CENTRAL DRIVE, FARMINGDALE, N. Y. 11735

(516) MY 4-3080